PERSONAL COMPUTER REPEATER CONTROLLER

PCRC II™

OPERATORS MANUAL

Version 2.04

Personal Computer Repeater Controllers

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Introduction to the **PCRC/2™** System

Features

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- Custom Voice Library

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Introduction

PCRC/2™ combines the power of the XT/AT platform with a high quality play and record voice digitizer to create the ultimate repeater controller.

The **PCRC/2™** design emphasis strived to eliminate site visits to perform routine repeater maintenance. To achieve this goal, digital pots are used in all the audio balance circuits, and a remotely accessible, user definable, configuration file is employed. The disk based software can be uploaded to the repeater site via modem or packet.

CTCSS, user definitions, timeouts, system messages, pager tones, speed dial, and other features to be set or adjusted over the air, over the phone, by modem or packet radio.

The voice digitizer plays back pre-recorded phrases used for prompts and repeater id's, and allows you to save messages on the system hard disk for later playback.

The **PCRC/2™** employs solid state cross point switches (like those used in electronic telephone systems) to control the mixing and separation of the various audio inputs and outputs. The cross point matrix allows **PCRC/2™** to output audio messages or record audio messages from virtually any repeater interface.

Standard DOS text files are used to store configuration and user control information. With this simple structure, the control operator will find the system very easy to configure and maintain. Software upgrades are provided free of charge to all registered users.

Just as a computer bulletin board system has users who log on to gain access to the system features, so do users in the **PCRC/2™** system. Each 'user' can be identified by their unique logon password. Once logged on to **PCRC/2™**, the user is granted or denied access to system features.

PCRC/2™ commands can be enabled/disabled on a user by user basis. The Sysop should have access to all commands while access to some commands will be denied to the general user, and the guest user. This allows you to maintain an open repeater for guests, with certain closed features such as autopatch, reverse patch, and user paging for recognized members.

All 32 CTCSS tones used for PrivateLine (PL) are supported by **PCRC/2™** when using the optional Communications Specialists TS-32. Up to 4 different PL tones may be selected for decode at any one time. The selected tones are stored in the configuration file, so changes can be made without a visit to the repeater site.

FEATURES:

- Plug in 8 bit PC boards for use in standard XT/AT type personal computer.
- High quality voice digitizer, 8 KHz ADPCM used for voice messages and system prompts.
- Multiple voice repeater id's in random or sequential order.
- Transmitter, DTMF, and digital voice diagnostics.
- Voice mail system and user directory.
- Full duplex autopatch with line balancing circuit. Complete with phone directory, FLASH, tone/pulse dialing, auto answer reverse patch, toll restriction, SMDR log, redial, and covertone.
- Up to 4 simultaneous CTCSS tones with the optional Communications Specialists TS-32.
- Remote Base of up to 4 Kenwood radios with the optional Doug Hall RBI-1.
- Unlimited number of function keys for each user.
- Unlimited number of user definable distinctive courtesy tones for main and auxiliary receivers.
- Digital voice play and record for custom natural voice prompts. Use our male or female voice, or your voice, for unlimited vocabulary and multi-lingual capability.
- Digital circuitry for remote control of all audio levels.
- DOS SHELL support for access to other programs.
- Batch command strings of unlimited length.
- BBS style logon concept
- Voice/Tone pager support; 2 tone, 5/6 tone, DTMF, group.
- Uses the PC's real time clock and date.
- Each command can be enabled or disabled for each user.
- BSR X-10 controller support.
- Digital I/O using the PC printer port to read switches and close relays.
- Scheduled events; one time only or reoccurring.
- Morse code practice from your text files or random generation. Any speed with voice readback.
- Analog/digital I/O with the optional PC LabCards PCL-711 interface card.
- Flexible backbone links, aux receivers and transmitters.
- Dead-man timers for software and hardware integrity.
- 911 Emergency Access to telephone interface or emergency channel.
- Background upload, download of all repeater files via modem or packet for flexible remote configuration.
- Interfaces with the One-For-All 12 Infra Red remote controller
- Total squelch tail and DTMF suppression with the optional PCRC Digital Audio Delay

HARDWARE

The XT/AT platform was chosen because it supports a wealth of hardware options and allows each user to build only as much system as their custom operation requires. This is the real benefit of the **PCRC/2™**.

Other controllers may set limitations on number of users, number of speed dials, and length of voice messages. **PCRC/2™** does not impose any of these restrictions. Your only real limitations are imposed by the environment you build around **PCRC/2™**.

For example, if you wanted the capacity to store 2 hours minutes of voice messages, you would simply need to provide a 30 MB hard disk. With the 8 KHz sampling rate **PCRC/2™** uses 14.4 MB for each hour of stored voice.

A dead-man timer is used to insure that the transmitter will not remain active if a hardware failure should occur. When used in conjunction with the reset pins on the mother board, an automatic hardware reset can be accomplished.

The **PCRC/2™** system includes this manual, the **PCRC/2™** controller board, a voice board, and interface cable.

A minimum system configuration includes:

XT/AT motherboard with 640K ram (turbo recommended)
video card and monitor *
hard disk and controller
floppy drive *
keyboard

Optional equipment required to support some features:

parallel printer port - hardware events and alarms
serial port - remote configuration via packet, BSR X10, One-For-All 12
modem - for remote configuration
audio delay - to mute touch tones and squelch tails
PCL-711 - analog and digital I/O
TS-32 - remote control of CTCSS decode

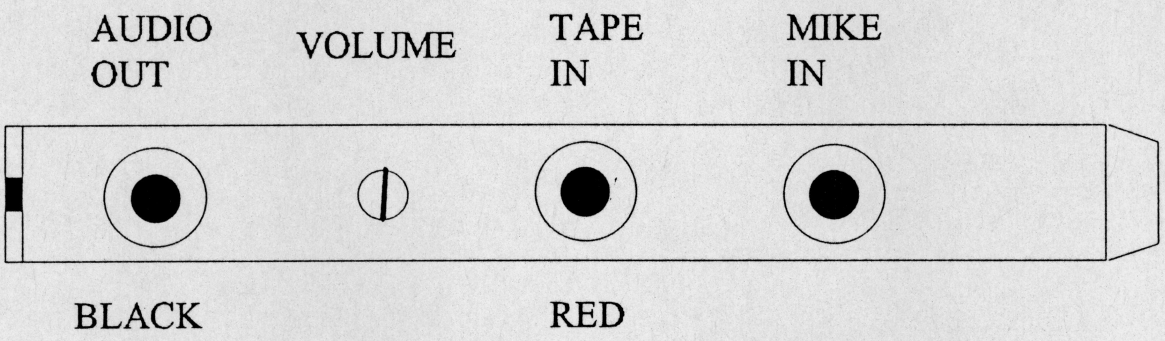
* Since the monitor and floppy disk drive are only required during the initial configuration, they need not be a permanent part of your **PCRC/2™** controller system.

Section I

HARDWARE INSTALLATION

The **PCRC/2™** interface card installs into any full size expansion slot of a PC/XT/AT mother board. The half size audio board should be placed into an expansion slot within reach of the RCA cables supplied.

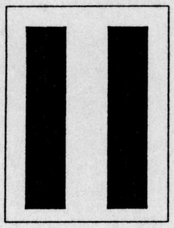
The RED RCA plug connects to the TAPE IN jack on the audio board, and the BLACK RCA plug connects to the AUDIO OUT jack on the audio board. At this time, the VOLUME control pot should be set about midway.



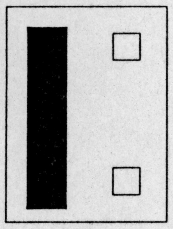
ADDRESS JUMPER J5

Be sure to set the proper address jumper connections on J5 of the **PCRC/2™** interface card that will allow it to function in your PC environment. The factory address selection of 200 Hex (512 Decimal) is usually used by the joystick port on many multi i/o cards. **If you are using a multi i/o card that contains a joystick port you must disable the joystick or change the PCRC/2™ address to prevent contention problems.**

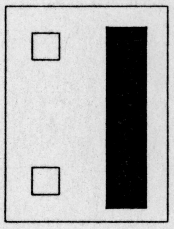
Other addresses available are 2C0H (704D), 280H (640D), and 240H (576D). If you change the board address be sure to indicate the change in the REPEATER.CFG file.



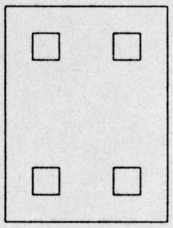
200 HEX
512 DEC



240 HEX
576 DEC



280 HEX
640 DEC

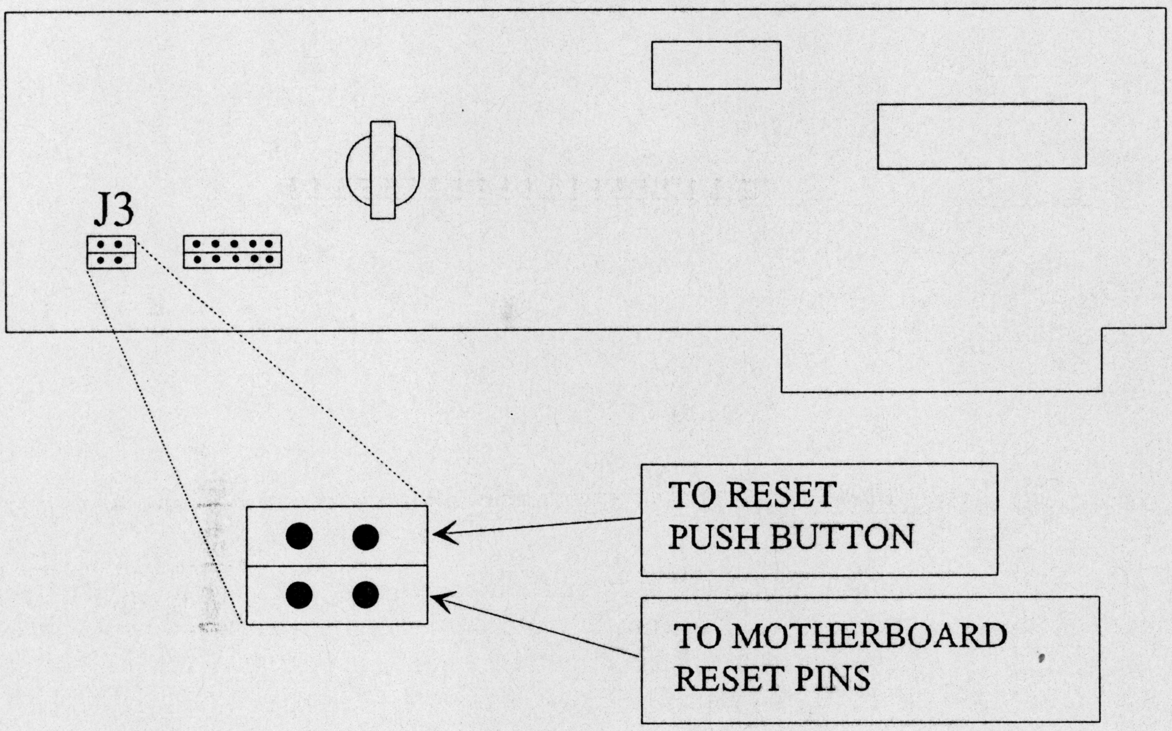


2C0 HEX
704 DEC

RESET JUMPER

PCRC/2™ contains a dead-man timer that will reset both the controller and the PC host in the unlikely event of a software or hardware malfunction. Connect a two pin jumper cable from the mother board reset pins to one side of the J3 connector on **PCRC/2™**.

If you also have a panel mounted momentary push button reset switch, it can be connected to the other side of J3.


J3
TO RESET PUSH BUTTON
TO MOTHERBOARD RESET PINS

CTCSS USING TS-32

PCRC/2™ will control the optional Communication Specialist TS-32 tone decoder when properly mounted and interfaced to connector J4.

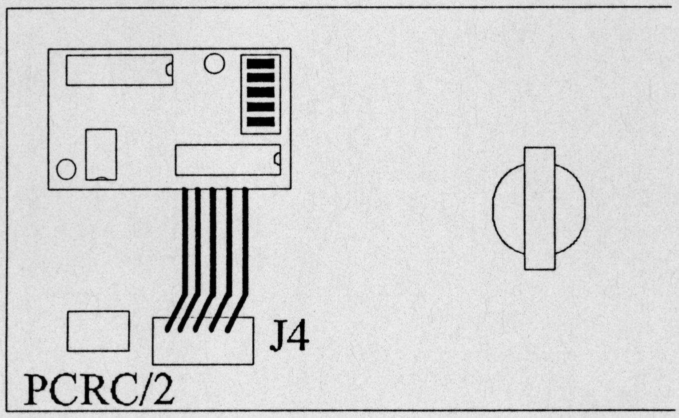
WARNING: The TS-32 switches MUST remain in the OPEN or OFF position to prevent damage to the **PCRC/2™** hardware and to allow **PCRC/2™** to control the tone selection via software.

The TS-32 can be ordered wired and ready for installation from PCRC. Please call for current price.

For proper operation the TS-32 HANG UP pin must be grounded, and JU-1 disconnected. The following connections are required to interface with **PCRC/2™**:

PCRC/2™	TS-32	PCRC/2™	TS-32
J4-1	**+V POWER**	**J4-2**	**DIP SW 5**
J4-3	**DECODER INP**	**J4-4**	**DIP SW 1**
J4-5	**OUT-1**	**J4-6**	**DIP SW 2**
J4-7	**- GROUND**	**J4-8**	**DIP SW 3**
J4-9	**(KEY)**	**J4-10**	**DIP SW 4**

Connections to the TS-32 dipswitches must be made to the non grounded side of SW-1 or directly to U1 (consult the schematic supplied with the TS-32 for more information).



TS32 INTERFACING TO PCRC/2

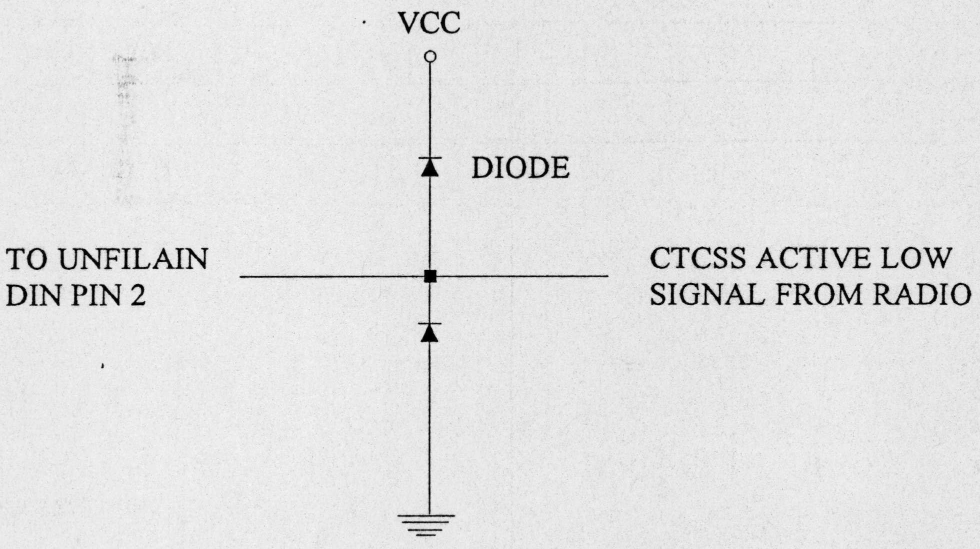
For more information on the TS-32 contact:

Communications Specialists Inc
426 West Taft Avenue
Orange CA 92665-4296
(714) 998 3021
(800) 854 0547
Fax (714) 974 3420

CTCSS WITHOUT TS-32

PCRC/2™ can monitor an active low signal from your receivers' built in CTCSS decoder. The signal must be TTL. It can be introduced to **PCRC/2™** on J2-7 (UNFILAIN) which is normally the audio input to the TS-32 by jumpering J4-3 to J4-5.

If you use the UNFILAIN line for this purpose you must provide input protection diodes (1N4148) between VCC and GROUND before the J2 connector. Refer to the diagram below for example.



CABLE PREPARATION

The cable supplied with **PCRC/2**™ has a DB-25M connector for interfacing to the full size interface card, two RCA connectors for interfacing to the audio board, an RJ-11 plug for connecting to a part 68 approved telephone interface, and three 8 Pin DIN jacks for interfacing to the main repeater and the two auxiliary inputs.

For your convenience we have included three 8 Pin Din plugs for the purpose of creating matching connections from your radio(s) to **PCRC/2**™. We suggest that you use shielded cable and a ferrite chokes (Radio Shack 273-104) when constructing your interfacing connections.

A description of each signal found on the three 8 Pin Din jacks follows. The signal naming convention is from the perspective of **PCRC/2**™. This means that signals with **IN** as part of their name are **in**puts to **PCRC/2**™, and signals with **OUT** are **out**puts from **PCRC/2**™. More information can be found in the schematics section of this manual.

RECAIN, AUX1AIN, AUX2AIN (Audio Signal -5v to +5v)

The receive audio signals which have been filtered to remove any sub-audible tones. Although not a necessity, if filtered audio is unavailable from the radio consider constructing the filter found in Appendix E.

UNFILAIN (Audio Signal -5v to +5v)

This signal feeds the optional on board TS-32 CTCSS decoder with un-filtered receiver audio from the main receiver.

LINKATCH (TTL buffer)

This line can be used to signal **PCRC/2**™ that a connection is requested between auxiliary transmitters/receivers and the main repeater. **PCRC/2**™ will monitor this TTL input for transitions, and execute one batch file after a low-to-high transition, and another batch file after a high-to-low transition.In this manner operators on the auxiliary side can link in the main repeater. (See also LINKS and AUX commands)

XMITAOUT, AUX1AOUT, AUX2AOUT (Audio Signal -5v to +5v)

The audio signals that will be transmitted by the main or auxiliary transmitters.

CARSEN, AUX1CIN, AUX2CIN (TTL buffer)

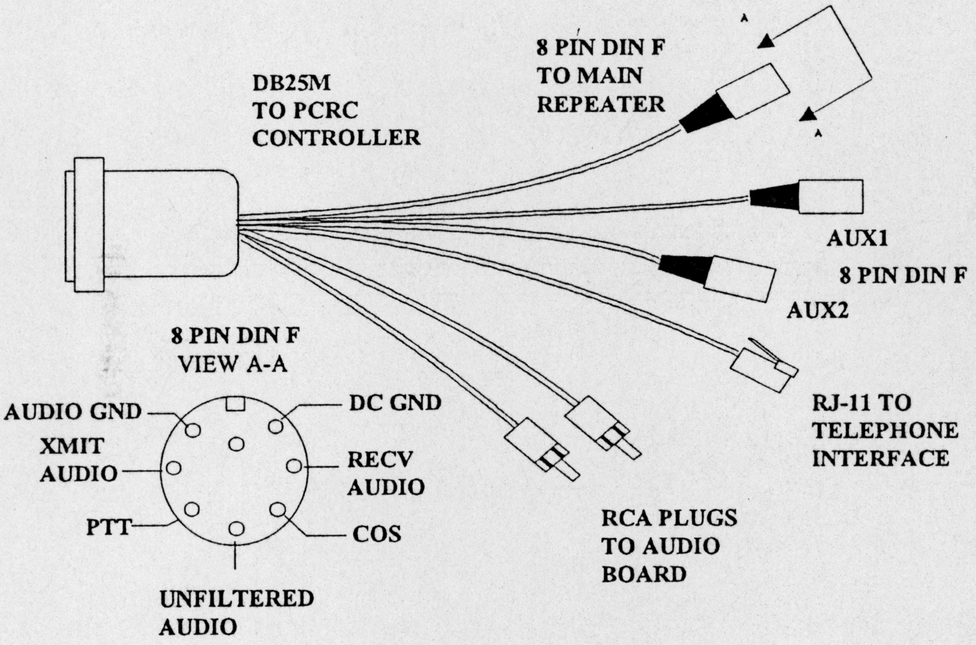
An active high signal that indicates the presence of receiver carrier on the main or auxiliary receivers.

PTT, AUX1COUT, AUX2COUT (transistor output)

An active low signal that will be generated by **PCRC/2™** to enable the main or auxiliary transmitters.

DC GROUND, AUDIO GND (0v)

To aid in noise immunity a separate power supply and audio ground bus is maintained on the **PCRC/2™** interface card until they are joined by a zero ohm jumper at R65.


8 PIN DIN F
TO MAIN
REPEATER
A
A
DB25M
TO PCRC
CONTROLLER
AUX1
8 PIN DIN F
AUX2
8 PIN DIN F
VIEW A-A
AUDIO GND
XMIT
AUDIO
PTT
DC GND
RECV
AUDIO
COS
UNFILTERED
AUDIO
RJ-11 TO
TELEPHONE
INTERFACE
RCA PLUGS
TO AUDIO
BOARD

SOFTWARE INSTALLATION

The **PCRC/2™** software is provided on three 5.25" DSDD 360K floppy disks or one 1.44 MB floppy. Revisions and updates are available from our 24 hour BBS. You will be given a free BBS account once you complete the **PCRC/2™** software registration agreement.

While it is possible to partially implement the **PCRC/2™** repeater controller on a dual floppy drive system, the following installation instructions assume that your PC\XT\AT platform contains a hard disk designated **C:**. The instructions pertaining to the **AUTOEXEC.BAT** file further assume that this system will be solely used as a repeater controller.

Some knowledge of DOS is required for proper system maintenance and operation. The software has been tested and is compatible with DOS versions 3.3 and 5.0. The DOS XCOPY program (which comes with DOS) must be on the path for the following installation instructions.

<u>DSHD 3.5" Installation:</u>

Create the directory **C:\REP** on the PC hard disk

```
C:
CD\
MD C:\REP
```

Change directory to **C:\REP**

```
CD \REP
```

Insert the floppy into A:, change to the DISK1 subdirectory, use XCOPY to copy the files.

```
CD A:\DISK1
XCOPY A:*.* /S /E
```

change to DISK2 sub directory Use XCOPY to copy files.

```
CD A:\DISK2
XCOPY A:*.* /S /E
```

change to DISK3 sub directory Use XCOPY to copy files.

```
CD A:\DISK3
XCOPY A:*.* /S /E
```

Use your favorite DOS editor to add the following lines to the C:\AUTOEXEC.BAT file.

```
CD C:\REP\MAIN
STARTREP
```

DSDD 5.25" Installation:

Create the directory **C:\REP** on the PC hard disk

```
C:
CD\
MD C:\REP
```

Change directory to **C:\REP**

```
CD \REP
```

Insert disk #1 into A: and use XCOPY to copy the files.

```
XCOPY A:*.* /S /E
```

Use XCOPY to install disk #2 and disk #3.

Use your favorite DOS editor to add the following lines to the AUTOEXEC.BAT file

```
CD C:\REP\MAIN
STARTREP
```

REPEATER.CFG

The next step is to create the file C:\REP\MAIN\REPEATER.CFG from the FACTORY.CFG file using your favorite DOS text editor. In the file REPEATER.CFG, you assign values to system **PCRC/2™** variables. Each is described below. You may create and save as many different configuration files as you require for varied repeater operation.

IDSTRING = KA2UGZR   IDSPEED = 20

The morse code id string and the morse code speed are defined by these variables. The IDSTRING should contain the control operator or sponsors call letters.

RWBLKSIZE = 32767   (16383/8191/4095)

This is the size of the data block that is transferred to and from the VP600 audio board. For most applications this is an optimum value. This value can be changed to 16383, 8191, or 4095 on systems where main memory usage (640K) is a problem. Normally you will not be changing this variable.

MAINPATH = C:\REP\MAIN\   VOICEPATH = C:\REP\VOC\
MESSAGEPATH = C:\USERMSGS\   RBATPATH = C:\REP\REPBAT\
FUNCTIONPATH = C:\REP\REPFUNC\

These are the DOS path name assignments for the standard **PCRC/2™** file structure. You may change the drive assignment and subdirectories to suit your requirements. If you do decide to deviate from the suggested file structure, be sure to correctly copy over the files that **PCRC/2™** expects to find in each of these directory assignments.

PRIVATELINE = 0   (0/1/2/3)

This variable describes the relationship between the main COS signal and the CTCSS signal. A zero indicates that the repeater will be carrier operated, a one indicates that a PL burst and carrier are required, and a two indicates that PL must be present with carrier for operation. Mode three ignores COS altogether and uses only CTCSS to indicate that the receiver audio is active. See commands 1700, 1701, 1702, 1703 for a further description.

PRIVATELINE1(1-4) = FALSE (true/false)

These four variables represent the four possible tone entries of the CTCSS queue that is used with the optional TS-32 tone decoder. Each of the four tones may be enabled or disabled. See commands 1710, 1711 for more information.

PRIVATELINETONE1(1-4) = 0 (0-31)

These four variables are the actual tone numbers used with the optional TS-32 tone decoder. See command 172nx for more information. Appendix C contains the complete tone table.

MODEMFLAG = FALSE (true/false)

TRUE indicates that a Hayes compatible modem is connected to the system. FALSE indicates that a packet TNC will be used.

COMPORT = COM1 (com1, com2)
BAUDRATE = 1200 (2400/4800/9600/19200)

These variables describe the communications port and speed that will be used with the Hayes compatible modem or the packet TNC.

X10ENABLE = FALSE **X10PORT = COM1** (com1, com2)

The BSR X-10 home controller must be attached to an unused communications port if X10ENABLE = TRUE. The X10 controller operates at a fixed baud rate and is not user selectable.

TRANSMITFLAG = XMITON (xmiton/disable)

This is the initial state of the transmitter upon power up. Refer to the commands 1000, 1001 for more information.

DIALPREFIX = NONE (none/prefix) **PREFIXPAUSE = 500** (in ms)

If a prefix is universally required when placing a call on the autopatch that string value should be associated with DIALPREFIX. A prefix is usually required with a PBX or CENTREX service. A pause that follows the prefix can be specified in milliseconds.

The DIALPREFIX does not apply when TOLLREST = 0, only when TOLLREST is 1/2/3. TOLLREST is a value used in the USER.SRC file.

PHONERING = TRUE (true/false)

If PHONERING is true, the reverse patch will ring over the air. See commands 1670, 1671 for more information.

DIALTYPE = TONE (tone/pulse) **PULSESPEED = 20**

These variables describe the type of service connected to the autopatch. If DIALTYPE=PULSE, PULSESPEED specifies the pulse rate in pulses per second.

FLASH = 500

Describes the flash time in milliseconds needed to access calling features (call waiting). See command 165 for more information.

TTONEON = 200 **TTONESPACE = 200**

Describes the DTMF timing for touch tones regenerated for the autopatch. TTONEON specifies the length of the tone in milliseconds, while TTONESPACE describes the silent period between tones.

MAXPHONETIME = 300

Specifies the autopatch disconnect timer in seconds. See command 164 for more information.

MAXMSG = 10

Limits the number of voice messages that will be saved for each user. MAXMSG defines the size of the rotating message queue for each user.

MAXUSER = 30

The number of users defined in the USER.SRC file must match the MAXUSER setting.

MAXUSERFUNC = 100

Use MAXUSERFUNC to limit the number of function keys that are definable by each user.

MAXMSGTIME = 90

The duration of any voicemail entry in seconds. Remember that each second represents about 4K bytes of disk space.

MAXUSERINFO = 60

The duration in seconds, of the user information recording that can be made with the 1330 command.

MAXNATIMERS = 1

The number of user definable no activity timers that will be used. See commands 370n, 371n for more information.

MAXRMSG = 49

The number of standard repeater messages reserved for **PCRC/2™**. This value might change with future software releases.

AUTOANSCNT = 5

The number of rings that **PCRC/2™** will count before answering the autopatch. See command 166n for more information. When set to 0, **PCRC/2™** will not answer.

RESETDEAD = TRUE (true/false)

Describes how **PCRC/2™** will respond should a watchdog reset occur. Additionally, when enabled, the system will reboot in response to an F10 keyboard command to halt the repeater. During the boot, a countdown message will appear on the screen: "YOU HAVE n SECONDS TO ABORT AND RETURN TO DOS... HIT ANY KEY TO RETURN TO DOS."
If no key is hit the repeater continues to boot up. See reset jumper for more information.

When disabled, the pc will not reboot in response to the F10 key or a watchdog event.

TRANSMITTERDEAD = TRUE (true/false)

Describes how the main transmitter PTT signal will be handled after a watchdog reset occurs. When set to TRUE, the PTT signal will be inactive. If FALSE, the transmitter may stay enabled until manually reset or automatically reset using the hardware reset pins.

MODEMANSENAB = FALSE (true/false)

Corresponds to the 1060, 1061 commands. For security, the FALSE setting is recommended.

HWEVENT1ENAB = INACTIVE (active/inactive)

These eight variables describe whether **PCRC/2™** will be monitoring the input lines on the PC parallel ports. Events 1-4 are monitored on LPT1: while 5-8 are monitored on LPT2:. See command 270n for more information.

AUX1AIN AUX1AOUT AUX1CIN AUX1COUT AUX2AIN AUX2AOUT AUX2CIN AUX2COUT

These eight variables are reserved for use by **PCRC/2™** and should always be FALSE.

LOADREAL = NONE (none/repeater command)

The repeater command following the equal sign is executed. The command is most often the Shell command to access the DOS program (such as TIMER), that will be run by **PCRC/2™** to set the system clock from the CMOS clock reference. This is used mostly on XT hosts. Alternate uses would be to access the Naval time standard in Annapolis via modem or decoding WWV on the mainland or WWVH in Hawaii.

X10HOUSE = 13 (1-16)

This is the house code setting that will be used to talk to the optional BSR X10 controller. The values A-P are represented by the numerical values 1-16. See command 263n for more information.

NOUSERTONE = 2 (any defined tone number)
NOUSERTONE1 = 3
NOUSERTONE2 = 4

These are the courtesy tone selections that will be used for the MAIN, AUX1, and AUX2 receivers when no user is logged on. See commands 1800, 1801, 1802 for further information.

USERTONE = 7 (any defined tone number)
USERTONE1 = 8
USERTONE2 = 9

These are the courtesy tone selections that will be used for the MAIN, AUX1, and AUX2 receivers when a user is logged on. See commands 1810, 1811, 1812 for further information.

PCLABBASE = 544 (see PCL-711 manual)

This is the address in decimal selected for operation of the optional PCL-711 analog/digital I/O interface card.

BASEADDR = 512 (512/576/640/704)

This is the default address in decimal selected for operation of the **PCRC/2™** interface card. See the HARDWARE INSTALLATION section for more information.

AUX1BACKBONE = FALSE (true/false)
AUX2BACKBONE = FALSE (true/false)

These variables describe the state of any backbone link configuration that may be present on AUX1 or AUX2. See command 3400 for further information.

LOGONNATTIME = 180
LOGONNATMASK = 1001

These variables define the period of no activity (in seconds) that a user will remain logged on, and the sources that will be monitored for activity. See the section on Activity Timers for further information.

AUX1NATTIME = 180 **AUX1NATMASK = 1001**
AUX2NATTIME = 180 **AUX2NATMASK = 1001**

These variables define the period of no activity (in seconds) that will occur before **PCRC/2™** automatically executes a 351 command. The mask indicates the sources that will be monitored for activity. See the section on Activity Timers for further information.

BBNATTIME = 180 **BBNATMASK = 1001**

These variables define the period of no activity (in seconds) on back bone links that will occur before **PCRC/2™** automatically executes a 3400 command. The mask indicates the sources that will be monitored for activity. See the section on Activity Timers for further information.

HANGTIME = 4000

This variable is used to indicate the amount of time in milliseconds the transmitter will remain on after the courtesy tone. The default is 4 seconds.

CARRIERHOLD = 20   CARRIERDELAY = 20   TTONEHOLD = 20

See commands 1011, 1012, and 1013.

FDPATCH = NONE   (none/aux1/aux2)

This variable describes which auxiliary audio channel will be used when making full duplex autopatches.

REMBASEINITWAIT = 0

This variable tells **PCRC/2™** how long in ms. to wait after initializing the Doug Hall RBI-1 at power up. The RBI-1 initialization time varies with the number and type of Kenwood radios in use.

PACKETID = KA2UGZ-1   (none/call)

This string will be down loaded to MYCALL on the packet TNC during initialization.

LOGFLAG = 30   (0/value)

PCRC/2™ will create a unique DOS file of the format nnnnnnnn.LOG each time the repeater is booted or reset. Log files are used as a diagnostic to record the last events and commands that were issued prior to a reset. The example shows that the last 30 events will be saved. Each of the 30 events will require 40 bytes of disk space.

When no logging is required set LOGFLAG = 0.

MAXXMITTIME = 300

The maximum number of seconds the transmitter will remain on before automatically cycling off. In the example, the transmitter will remain on for 5 minutes before transmitting REPMSG 24, the repeater id in morse code, and shutting off the transmitter. When constant carrier is no longer detected, normal operations will resume.

This is a transmitter fail safe in the event that someone keys the repeater for long periods of time either intentionally or accidentally by sitting on their microphone.

WAKEST = 9678DAD

A string of digits that can be entered via a touch tone pad to wake up the repeater when it is put into security sleep mode with the 109 command.

WAITTONE = 100

The amount of time in milliseconds between carrier drop and the beginning of the courtesy tone. This value applies to the main, aux1 and aux2 receivers.

AUDIODELAY = NONE (none/aux1/aux2)

When an optional hardware audio delay line is used to remove squelch tail and fully mute DTMF digits on the main receiver, this variable specifies which aux port is used as the audio process loop. See Appendix F for more details.

VBTYPE = VP600 (vp600/sb)

The Antex VP600, and the SoundBlaster are the only audio boards that can be specified for use with **PCRC/2™**.

DEBUGFLAG = 0 (0/1/2)

The **PCRC/2™** system supports two levels of run time diagnostics. When enabled, both of these levels decrease the operating efficiency of the repeater. When level **1** is selected, all commands embedded in batch files and function keys are displayed on the control screen. The lower right corner of the control screen will display the internal stack parameters. When level **2** is selected, **PCRC/2™** will announce each command (except 99nnn commands) before they are executed.

When no diagnostics are required level **0** is selected.

PRIOCARR1 = 010 (mask value 1/0 for main, aux1, aux2)
PRIOCARR2 = 101 (mask value 1/0 for main, aux1, aux2)
PRIOCARR3 = 000 (mask value 1/0 for main, aux1, aux2)

These three variables are used to set the priorities for the receivers present in the system. The receiver with the highest priority should be identified in PRIOCARR1, the next highest in PRIOCARR2 etc.

In the examples above, the aux1 receiver has the highest priority, main and aux2 have equal and secondary priorities. When carrier from two or more receivers is present at the same time, the audio of the receiver with the higher priority will take precedence, audio from equal priorities will be mixed.

Since aux2 has the highest priority it can be considered a 'control receiver' since it will always gain control from the main and aux2 receivers.

CARRLOCKOUT = 010 (mask value 1/0 for main, aux1, aux2)

The bit mask defines which receiver(s) can lockout the other(s). When set to 000 no receiver can lock out any other. When set to 111, which ever receiver is in control, stays in control until it drops COS, giving all receivers the same chance at monopoly again.

As shown, when the aux1 receiver becomes active, it will stay active, until it releases COS, even if it has the lowest priority of the three receivers. In this case the CARRLOCKOUT mask can override the PRIOCARR mask setting. For most installations, a 000 value will be used when a 'control receiver' is established.

ONEFORALL = NONE (none/com1/com2)

Defines where the optional One-For-All 12™ infra red controller is connected.

REMBASE1PNUM = 0 (0/n)
REMBASE2PNUM = 0 (0/n)

These variables associate a Doug Hall RBI-1 remote base controller with one of the ports defined in the PPORTS.DAT file. **PCRC/2™** can be interfaced to two RBI-1's. At powerup, remote base number 1 is selected if REMBASE1PNUM is initialized to a non-zero value, otherwise remote base number 2 is selected if REMBASE2PNUM is non-zero.

HWE14PNUM = 0 (0/n)
HWE58PNUM = 0 (0/n)

These variables associate hardware events 1-4 and hardware events 5-8 with one of the ports defined in PPORTS.DAT.

ENAB911 = USER (USER/NOUSER)

When USER is selected, the operator must be logged on to access the emergency communications associated with the *911 command. When NOUSER is selected, anyone may execute the *911 command.

COMMAND SETS

The COMCLASS program is used to create user command profiles called COMMANDSETs. Start by defining three different types of potential users of your repeater system, associating each with a different command set. Type COMCLASS at the DOS prompt to define user classes.

The first type of user should have access to all commands and administrative functions. He will be known as the SUPERUSER, and holds the place of honor as user number 1 as we will see in the next section.

The second type of user should have very limited access to commands, and no administrative functions. He will be known as the guest user. The guest user is the default when no one is logged on. Typically only a few functions are available to him.

The third type of user should have more access to commands than the guest user, but less access than the superuser. This user is you. Start by giving yourself access to all of the harmless commands, some of the administrative commands, and few or none of the heavy duty maintenance commands.

These are the following guidelines we use on our personal machine. They may be helpful to you in defining user access.

Assign only one SUPERUSER category account. The fewer people with this type of access the more secure the repeater.

The SUPERUSER account should only be used when necessary to perform a configuration or maintenance function.

Assign the repeater sponsor(s) a command set that allows them to control all functional aspects of the machine such as access to the links, autopatch, audio levels, courtesy tones etc.

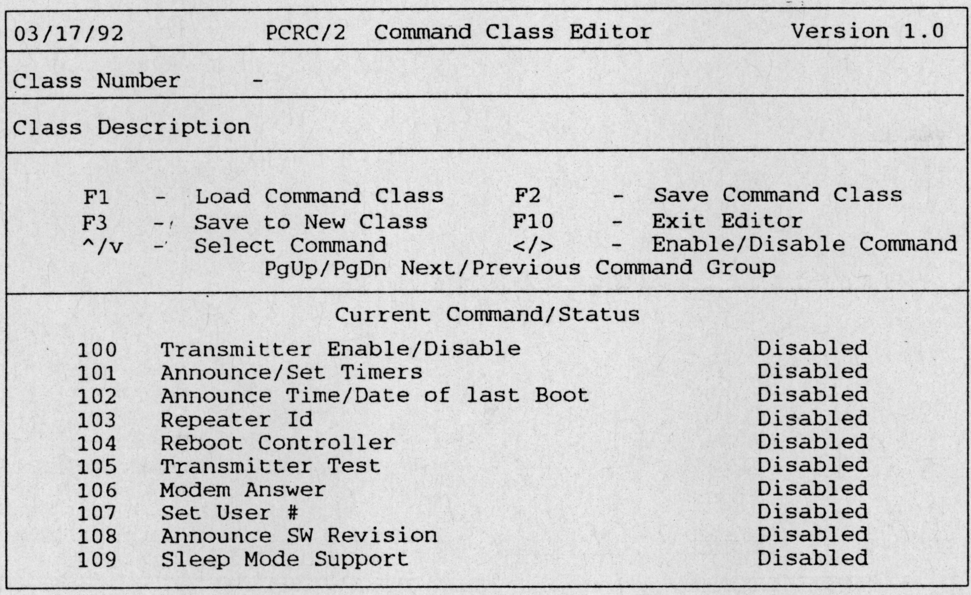
Assign significant repeater users and responsible individuals some of the basic commands, access to the autopatch if they share in the phone bill responsibility, morse code practice etc.

Assign the GUEST USER just enough commands to make your machine attractive and distinctive while letting you operate an open repeater while safe guarding some of the goodies like autopatch, and remote base.

Remember, you can define a different custom command set for each user, or one set that fits all. Commands are identified by their three most significant digits which is the *command root*.

All **PCRC/2™** commands within a command root are enabled or disabled at the same time. For example, commands 1011, 1012, 1013, 1014 have 101 as their command root.

The following is an example of the command class editor screen.



```
03/17/92            PCRC/2  Command Class Editor           Version 1.0

Class Number      -

Class Description

     F1    -  Load Command Class      F2      -  Save Command Class
     F3    -  Save to New Class       F10     -  Exit Editor
     ^/v   -  Select Command          </>     -  Enable/Disable Command
                   PgUp/PgDn Next/Previous Command Group

                         Current Command/Status
     100   Transmitter Enable/Disable                   Disabled
     101   Announce/Set Timers                          Disabled
     102   Announce Time/Date of last Boot              Disabled
     103   Repeater Id                                  Disabled
     104   Reboot Controller                            Disabled
     105   Transmitter Test                             Disabled
     106   Modem Answer                                 Disabled
     107   Set User #                                   Disabled
     108   Announce SW Revision                         Disabled
     109   Sleep Mode Support                           Disabled
```

The pc keyboard arrow keys are used to select and change values highlighted by the cursor. The UP/DOWN arrows select the three digit command, while the LEFT/RIGHT arrows are used to enable or disable the command. The PGUP/PGDN keys are used to page through the commands.

Use the F1 key to load and view the sample command sets 1,2, and 3 that are provided by the factory. Command set 1 is suggested as suitable for the control operator, command set 2 for the guest user, and command set 3 for regular users.

The F2 key is used to save the parameters that are in memory to the selected command set. The F10 key is used to exit to the DOS prompt.

The F3 key saves memory to a new command set. To create a new command set, first load an existing set into memory, make the necessary modifications to the memory image, and write the memory image to a new command set. Command sets may be assigned to any number. Use the description field to make notes about each class you create. For instance: "Club members with autopatch privilege", "Members with remote base privilege".

All command sets must have 990-999 enabled since all user passwords begin with a 99n command root.

USER FILE

The next step will be to edit the DOS user file USER.SRC to create accounts for the control operator, and users. During this process you will assign passwords, command sets, pager codes, toll restriction, and user numbers.

Each user account description contains key words such as USER=, COMMAND=, CALL=, and NAME=. Account descriptions must begin with the USER= key word and end with the ENDUSER key word. The asterisk (*) is used to identify comment lines within the USER.SRC file.

USER= numbers are referenced in voice mail message commands, paging, autodialing, and to generally identify all repeater users in a fashion that can be accessed with DTMF tones. User numbers are public knowledge that is divulged with the 131n command.

A user code (CODE=) is the unique secret password that is used to log onto the repeater and identify the user to **PCRC/2™**. Once a user code is recognized, the commands defined by the associated COMMANDSET= are made available. Both USER= numbers and CODE= passwords must be unique.

User zero must always have '999' as a password so that user zero is automatically logged on when ever other users log off (99999 command). The '99' prefix is assumed so it is not necessary to include it in the '99' prefix in the CODE= string. For example:

Password 99123	CODE=123

User codes can be of any length, and comprised of any combination of numbers and the letters ABCD which are found on standard touch tone pads. The only exception is that the position immediately following the 99 prefix must be a number; there after any number/letter combinations are valid. The asterisk (*) and pound (#) keys can not be used in passwords. For example:

Valid passwords:	99123	991A3BC	999D44A
Invalid passwords:	99ABC	991EFG	991*B*C

Passwords which contain letters can not be entered on 12 key DTMF pads such as those found on telephones.

The TOLLREST= entry is used to define the type of access that will be granted to the autopatch. Permissible entries are 0-4. See the TELEPHONE PATCH section for more information.

The CALL= and NAME= entries are the strings that will be spelled out by **PCRC/2™** in response to the 1321n and 1341n commands.

The PAGECOMMAND= key word is used to describe the pager command that will be executed in response to the 150n command. Alternately, any valid **PCRC/2™** command may follow the equal sign. Three examples follow:

```
PAGECOMMAND=151707*399   two tone pager
PAGECOMMAND=1562768      DTMF pager
PAGECOMMAND=1605551212   dial phone number 555-1212
```

Command classes are assigned using the COMMAND=COMMANDSET,n key word structure. Additional command roots may be added or removed using the ADD and DEL keywords. These assignments must always follow the initial assignment of a command set. Only one assignment is processed per line. The next example illustrates how to add autopatch privileges and remove the ability to change audio levels. These commands do not modify the content of command set 4. They only apply to this user definition.

```
COMMAND=COMMANDSET,4
COMMAND=ADD,160
COMMAND=DEL,210
COMMAND=DEL,211
```

All commands are enabled when COMMAND=SUPERUSER is selected.

The keywords HOMEPHONE= and WORKPHONE= are used to assign the phone numbers that will be dialed in response to the 162/163 dial user at home/work commands. It is not necessary to include the 160 prefix. For example:

```
HOMEPHONE=5165634715
WORKPHONE=5551212
```

The DIALTHRU= key word followed by YES or NO is used to tell **PCRC/2™** whether this user is permitted to pass through DTMF digits. For **PCRC/2™** to properly enforce toll restriction dial through should be disabled so that touch tones are muted.

When you are finished editing the USER.SRC file it must be scanned and prepared for use by **PCRC/2™** by typing COMPUSER at the DOS prompt. The COMPUSER program will convert the ascii text file into a binary string and check for entries with the same USER number or CODE. USER.SRC and COMPUSER must be in the same directory. Usually they reside in C:\REP\MAIN.

A sample of USER.SRC follows:

```
*                                    LAST REVISED 1-30-93
*       LEVEL 0 USER
*
USER=0
CALL=NONE
NAME=NONE
CODE=999
COMMAND=COMMANDSET,3
ENDUSER
*
*       CONTROL OPERATOR
*
USER=1
CALL=KA2UGZ/R
NAME=SYSOP
CODE=678A1B2C3
COMMAND=SUPERUSER
TOLLREST=0
DIALTHRU=YES
ENDUSER
*
*       USER 2
*
USER=2
CALL=KA2UGZ
NAME=JAY
CODE=28791
TOLLREST=4
DIALTHRU=NO
HOMEPHONE=5634715
COMMAND=COMMANDSET,4
COMMAND=ADD,160
COMMAND=ADD,161
COMMAND=ADD,162
COMMAND=ADD,163
COMMAND=ADD,164
ENDUSER
```

OPTIONAL FILES:

The following files need to be created or changed if you will be using these features in your system: SWEVENTS.DAT, WORDS.COD, PPORTS.DAT, AUTOEXEC.BAT, TOLLREST.DAT, ANALOG.DAT.

SWEVENTS.DAT

Software events are described in this file. Use your DOS editor to view and change the C:\REP\MAIN\SWEVENTS.DAT text file. As initialized at the factory, **PCRC/2™** will repeatedly execute system macro 100 on the quarter hour, and system macro 101 one second past the hour. As supplied, macro 100 performs a voice ID or beacon, while 101 speaks an invitation to prospective repeater users.

```
01-01-1991,12:00:00,115,2,250100
01-01-1991,12:00:01,160,0,250101
```

Change this file to schedule any automatic commands that you might want to execute. By using command macros instead of direct **PCRC/2™** commands you are assured that scheduled events will take place no matter who is logged on, no matter whether their command set gives them access to the scheduled command.

See the SCHEDULED EVENTS section for more information.

WORDS.COD

This DOS text file contains words that will be randomly selected by **PCRC/2™** during a morse code practice session initiated by command 292.

A sample file follows.

```
TIMELY
TEST
HIGH
FROM
HELLO
LOOK
```

See MORSE CODE PRACTICE for more information.

PPORTS.DAT

If you will be defining digital I/O ports for hardware events or RBI-1 remote base, edit the DOS file C:\REP\MAIN\PPORTS.DAT to create the proper definitions. The sample file contains information in decimal, that assigns and describes the input and output port addresses and names.

```
OADDRESS,1,888
INIT,1,255
IADDRESS,1,889

IADDRESS,2,550
IADDRESS,3,551
OADDRESS,2,557
OADDRESS,3,558
```

The standard address for LPT1:, 888 (378H) is assigned to output port number 1 and will be initialized to 255 (FFH). The input portion of LPT1:, 889 (379H) is also defined.

The PCL-711 card has two digital ports that are factory defined at 550 (226H), and 551 (227H). The corresponding output addresses can be found at 557 and 558. See the PCL-711 documentation if it is necessary to change the card address. See the section on DIGITAL I/O for more information on the PC Lab Cards PCL-711 operation.

AUTOEXEC.BAT

If the host computer is an XT, add any clock related commands to the C:\AUTOEXEC.BAT file at this time. The sample below shows using TIMER to set the clock on an XT that uses this type of clock hardware. AT type computers have a CMOS time reference that is automatically referenced at boot time. The autoexec file will be executed whenever the repeater suffers an AC power loss, is intentionally rebooted with the 1040 command, or sustains a watchdog reset (providing the reset circuit hardware is installed).

```
PROMPT = $P$G
PATH = C:\;C:\DOS
TIMER/S
CD\REP\MAIN
STARTREP
```

CONFIG.SYS

The FILES and BUFFERS statements must be properly set to allow **PCRC/2™** to properly operate. The following is the minimum recommended:

```
FILES = 30
BUFFERS = 30
```

TOLLREST.DAT

If you will be attaching an autopatch you should create the file C:\REP\MAIN\TOLLREST.DAT to prevent access to certain exchanges and area codes. When toll restriction level 4 is selected for a user in the USER.SRC file, the TOLLREST.DAT file will be referenced as a result of each autopatch attempt.

```
INCLUDED AREA CODES
212
718
516
EXCLUDED EXCHANGES
976
555
```

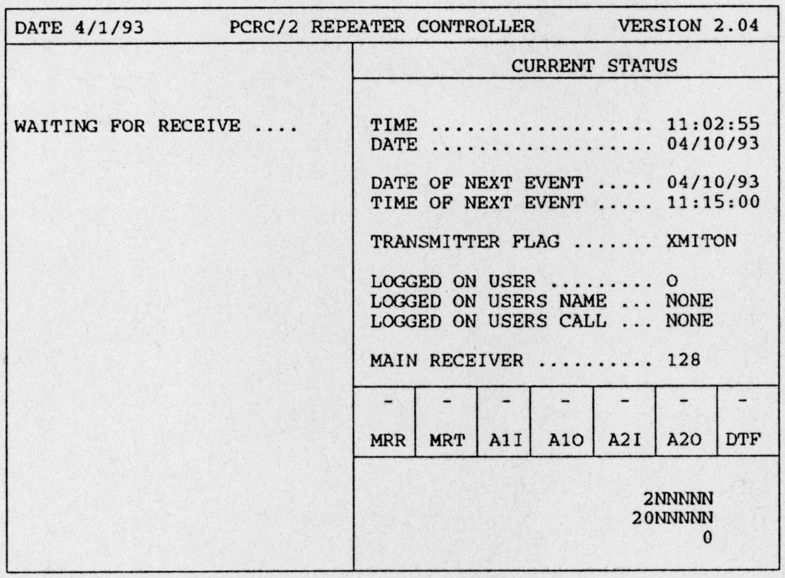
ANALOG.DAT

This file is used with the optional PCL-711 analog and digital I/O interface. A sample of this file follows:

AUDIO TUNEUP

Having completed both the hardware and software installations, it is now time to start up the repeater and set the audio levels. Using the built in **PCRC/2™** tone generator and a known level, we will rough in the audio settings. Two radios will be required. One to key up and talk into, and one to monitor the repeater audio output.

Boot the system software. The screen should look like the one below.



```
DATE 4/1/93          PCRC/2 REPEATER CONTROLLER          VERSION 2.04

                                          CURRENT STATUS

WAITING FOR RECEIVE ....       TIME .................. 11:02:55
                               DATE .................. 04/10/93

                               DATE OF NEXT EVENT ..... 04/10/93
                               TIME OF NEXT EVENT ..... 11:15:00

                               TRANSMITTER FLAG ....... XMITON

                               LOGGED ON USER ......... 0
                               LOGGED ON USERS NAME ... NONE
                               LOGGED ON USERS CALL ... NONE

                               MAIN RECEIVER .......... 128

                                -     -     -     -     -     -     -

                               MRR   MRT   A1I   A1O   A2I   A2O   DTF

                                                       2NNNNN
                                                      20NNNNN
                                                            0
```

Use the right and left arrows on the PC keyboard to select the **TONE OUTPUT** level pot.

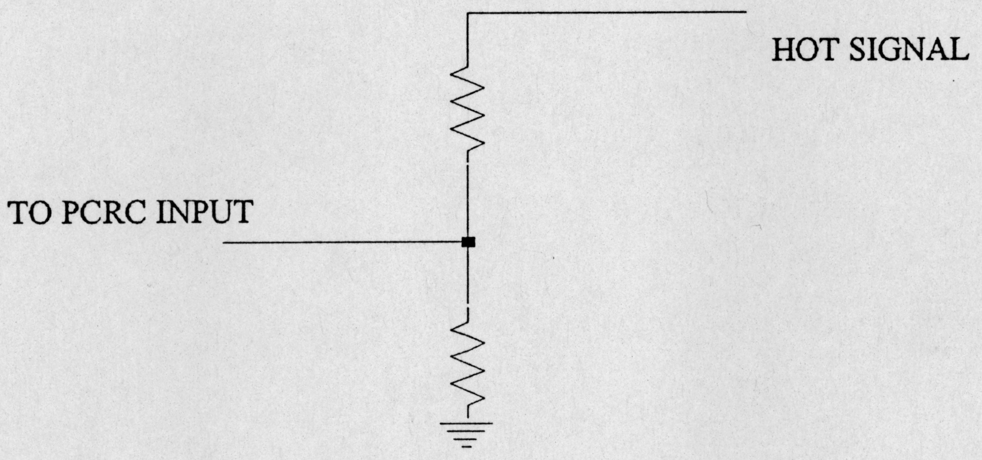
Use the up and down arrows to select a value of **128**, the midpoint.

Key up and release the repeater listening for the courtesy beep.

Use the right and left arrows to select the **MAIN TRANSMITTER** level pot.

Adjust the **MAIN TRANSMITTER** output level pot until the courtesy tone sounds clear on the monitoring radio. If the courtesy tone is over driving the transmitter, use a lower pot setting. If the tone is too low, use a higher pot setting. If over driving persists with a low pot setting (10 or so), it will be necessary to apply a voltage divider circuit to achieve satisfactory results.

Adjust the **MAIN RECEIVER** input level pot until the incoming audio and the courtesy beep sound to be at the same volume level with no distortion. Again, if the receiver is over driving **PCRC/2™** , and the pot setting is already low, it will be necessary to apply a voltage divider to the incoming audio signal.



Adjust the **TOUCH TONE INPUT** pot for reliable DTMF decoding. It may be necessary to lower the **MAIN RECEIVER** audio if DTMF tones are not being decoded due to over driving with a low pot setting.

Adjust the **TOUCH TONE OUTPUT** pot so that regenerated DTMF tones (see command 142) can be decoded by equipment listening on the output frequency of the repeater.

Adjust the **DIGITAL AUDIO OUTPUT** pot so that the pre-recorded digital voice is about the same audio level as repeated audio. You can use the 1101 command to generate the pre-recorded audio.

Adjust the **DIGITAL AUDIO INPUT** pot so that recorded audio (see command 140) plays back at about the same audio level as repeated audio. If you can not achieve satisfactory results, verify that the audio board pot (between the RCA connectors on the VP600) is set at the mid-point.

Similarly adjust phone and auxiliary audio(s), comparing their levels to the repeated audio or courtesy tone levels. The Phone Balance is done last with the 168 command. At this point only minor changes should be necessary to fine tune the audio levels. Use the F9 key to record and store all the pot levels. The next time the repeater boots up it will reference the stored settings.

Section II

COMMANDS

A command is a pre-defined string of digits intended to direct or modify the behavior of the **PCRC/2**™ controller.

When issuing commands over the air, the command string is terminated when the receiver notifies the controller that carrier has been dropped.

Commands issued from the phone line can not be terminated with a loss of carrier, instead ** is used.

Commands that disable or enable a function have the same root command followed by **0** to disable and **1** to enable.

The # key is used in many **PCRC/2**™ commands. If you make a mistake when entering a command over the air, use a single # and un-key to tell **PCRC/2**™ to ignore or cancel the preceding digits. Several commands may be strung together by separating them with a #.

Example: 1030#1100 Execute command 1030 and command 1100

A double ## is used to place a single # into the PCRC command line.

Example: 142123##456 Generates DTMF tones 123#456

The ### key sequence is used to issue commands to **PCRC/2**™ when the transmitter remains active and can not be un-keyed to accept command strings. When using remote base or other auxiliary inputs that may keep the main transmitter keyed, the command string surrounded by ### will be recognized and executed by **PCRC/2**™.

Example: ###351### can be used to turn off Aux 1 even if the Aux 1 receiver is causing PTT to be constant.

Some commands can be entered directly from the PC keyboard. The left and right arrows are used to select from the 14 digital pots that can be modified, while the up and down arrows are used to change the pot values in memory.

The F8 key will return the pots to their previously saved value. The pots settings are stored to disk by using the F9 key. F10 is used to halt the repeater and return to DOS or reboot the system if RESETDEAD is true.

PCRC/2™ transmits a cover tone as soon as touch tone digits are detected. The cover tone lets other users know that the repeater is in use while giving a moderate level of security by not transmitting the received tones.

The user definable variables that pertain to the operation of each command are indicated to the right of each command described in the next section. These variables are found in the REPEATER.CFG file.

Repeater Control

1000/1001 TRANSMITTER DISABLE/ENABLE — TRANSMITFLAG

There are times when it may be necessary to disable the transmitter during diagnostic testing. When the transmitter is disabled all other repeater functions are left intact.

This command also effects the operation of auxiliary transmitters that follow the main repeater transmit operation. See section on **Links** and **Remote Base**.

1011*n SET CARRIER HOLD TIME TO n MS — CARRIERHOLD

The carrier signal (CARSEN) is de-bounced by the **PCRC/2™** software. COS must be inactive for a for a period greater than **n** ms before it will be validated as dropped. When no parameter is supplied, the current value is read back.

1011*100	set carrier hold to 100 milliseconds.
1011	PCRC/2™ announces "100 milliseconds"

1012*n SET CARRIER DELAY TO n MS — CARRIERDELAY

The carrier signal (CARSEN) is de-bounced by the **PCRC/2™** software. COS must be active for a for a period greater than **n** ms before it will be validated to open the transmitter. When no parameter is supplied, the current value is read back.

1011*100	Set carrier hold to 100 ms.
1011	PCRC/2™ announces "ONE HUNDRED MILLI SECONDS"

1013*n SET DTMF HOLD TO n MS — TTONEHOLD

To prevent double keys, the threshold can be set to validate the minimum duration of quiet between valid DTMF digits. When no parameter is supplied, the current value is read back.

1014*n SET HANGTIME TO n MS — HANGTIME

To prevent unnecessary cycling of the transmitter during a QSO, the transmitter can be left on for a period following COS dropping. When no parameter is supplied, the current value is read back.

1015*n SET COURTESY TONE DELAY TO n MS

WAITTONE

The time segment following COS drop and the beginning of the courtesy tone can be customized and expressed in milliseconds.

1016*n SET COVERTONE TIME n MS

TTCOVER

A cover tone is transmitted when touch tones are first detected. **PCRC/2™** begins counting down **n** milliseconds before ending the cover tone and repeating audio.

102 ANNOUNCE BOOT DATE AND TIME

At boot time, the date and time are recorded. This diagnostic command announces that information.

1030 REPEATER ID

IDSTRING, REPID, IDSPEED

When invoking this command the transmitter is keyed and the voice file REPID.SPC is played. REPID contains the Repeater ID message. It has been initialized at the factory to be "PCRC/2". During initialization you will replace this file by recording repeater phrase 1, with a brief voice file containing the call of the sponsor:

"KA2UGZ REPEATER".

If carrier is detected while the message is being played, the IDSTRING call letters will be sent as a morse message at the speed selected by IDSPEED.

IDSTRING and IDSPEED are set in the REPEATER.CFG file.

1031 SEQUENTIAL ID

PCRC/2™ will select an id message, in rotation, from the list of enabled phrases (command 224) id voice messages recorded with the **RECORD REPEATER PHRASE** command (221). These id's are stored as voice messages 40-49.

1032 RANDOM ID

PCRC/2™ will randomly select an id message from the list of id voice messages recorded with the **RECORD REPEATER PHRASE** command.

104 RESET/REBOOT CONTROLLER

This command is the equivalent of a DOS CTRL-ALT-DEL. Key up during the tone prompt and type 0 to perform the reset. If the zero is not sent the reset command is cancelled.

1050 TRANSMITTER TEST

This diagnostic command keys the repeater transmitter for up to 180 seconds. A courtesy tone of 200ms is generated every 10 seconds while the transmitter is on.

The test is terminated when carrier is detected or when 180 seconds expires.
This feature is useful when making output power, SWR measurements, or frequency adjustments on the transmitter.

1060/1061 DISABLE/ENABLE MODEM ANSWER

MODEMANSENAB, COMPORT, BAUDRATE

When enabled the modem will answer an incoming call from the telephone network on the first ring. When disabled, the reverse patch will answer the incoming call on the programmed ring (provided that it is enabled and will answer on n rings).

This feature allows both the modem and autopatch to utilize the same physical phone line.

107n SET USER TO n

Once logged on as the SUPERUSER, the sysop can 'become' any other user id with SUPERUSER privileges.

This feature allows the sysop to create USER0 messages as well as cleanup any other user account.

See also MESSAGE CONTROL section.

108 SOFTWARE REVISION LEVEL

Announces the revision level and date of the **PCRC/2™** software that is loaded. These values can also be found in the upper right and left corners of the main screen on the video display.

1090nn..nn SET WAKE STRING

WAKEST

This command is used to set the password which will wake up the repeater when it is in a security sleep mode.

The security sleep mode is discontinued when the valid password is given. The WAKEST variable is set in REPEATER.CFG.

1091n ENGAGE SECURITY SLEEP MODE n

Sleep mode can be engaged when it becomes necessary to retire the repeater for a period of time. Usually sleep mode is used when no control operator is available or to discourage hackers. The parameter **n** is a value of 0-7 which represents a bit pattern that defines the state of sleep that **PCRC/2™** will be placed into. The three least significant bits define the state of the transmitter, how touch tones are handled, and how the repeater can be awakened.

If Bit 0 = 1
then the transmitter will be on, and received audio will repeat.
If Bit 0 = 0
then the transmitter will be off, and received audio is not repeated.

If Bit 1 = 1
then touch tones presented by the receiver will be recognized and acted upon.
If Bit 1 = 0
then touch tones will be ignored.

If Bit 2 = 1
a valid user logon will wake the repeater.
If Bit 2 = 0
only the valid wake string command will wake the repeater.

When the logon is used to wake the repeater, recognized users can act as the control operator. This mode is useful when maintaining an open repeater during day light hours and a closed repeater when the control operator is sleeping. If slumber is to continue when the user logs off, the sleep command should be part of the system logoff batch file RB0_43.RBT.

A summary table follows:

n = 0 transmitter is off, touch tones are ignored, wake string needed to awaken
n = 1 transmitter is on, touch tones are ignored, wake string needed to awaken
n = 2 transmitter is off, touch tones are acted upon, wake string is needed
n = 4 transmitter is off, touch tones are ignored, log on awakens repeater
n = 5 transmitter is on, touch tones are ignored, log on awakens repeater
n = 6 transmitter is off, touch tones are acted upon, logon awakens repeater

Modes 3 and 7 behave the same as the standard repeater does when it is awake and therefore have little value.

TIME/DATE COMMANDS

1100/1101 ANNOUNCE TIME

Announces the time in AM/PM or military format.

1102n ANNOUNCE TIME AM/PM IF CHANGED
1103n ANNOUNCE TIME MILITARY IF CHANGED

Announces the time in AM/PM or military format only if the time has changed **n** minutes since the last time announcement.

1110 LOAD TIME\DATE

LOADREAL

The DOS date and time is derived from the microprocessor time base. If it is not periodically refreshed from the stable CMOS time base, the scheduled events will become out of sync with real time.

This command will execute the **PCRC/2**™ command associated with the LOADREAL string found in the configuration file.

ie: TIMER/S or SETCLOCK typically used to set the time and date in XT's

LOADREAL = 23030*1*25 will execute RSHELL25.BAT which contains the TIMER/S command.

The shareware TIMESET program could also be used to retrieve the naval standard time from Annapolis MD by modem.

1120hhmm SET TIME DIRECT

Sets the DOS clock from direct entry where hhmm are the hours and minutes in military format. On AT's this command also updates the built in CMOS clock.

Example: 11202040 will set the time of day to 8:40 PM.

1130 ANNOUNCE DATE

Announces the day of the week and the date.

1150mmddyy SET DATE DIRECT

Set the system date from direct entry where mmddyy are the month day and year.

Example: 1150092391 will set the date to September 23 1991.

MESSAGE CONTROL

PCRC/2™ users are identified by their unique user number for sending messages, keeping track of user activity and assigning access to **PCRC/2™** features and commands.
USER0 is active when no one is logged on to the repeater, and accounts for all activity by the guest users on an open repeater. USER0 is also the 'pseudo originator' of all general messages that may be used as bulletins to all general users.

Only the SUPERUSER can create USER0 messages by first logging on as the SUPERUSER and 'becoming' USER0 with the SET USER command.

120n LEAVE MESSAGE FOR USER n

MAXMSG, MAXMSGTIME

PCRC/2™ acknowledges a command to record a message for a valid user with a five second tone. To record the message the user must key up the transmitter during the tone, then speak their message.

If the user is logged on from the reverse autopatch, no activation of the transmitter is required. The message may be left after the tone prompt.

The end of the message is defined to be either when carrier is released, when the programmable message length timer MAXMSGTIME has been exceeded or when ** is typed on the reverse autopatch.

Example: 12155 instructs **PCRC/2™** to leave a message for USER55.

If the message length timer has been exceeded, **PCRC/2™** will sound a tone to advise the user that some of their message was not captured.

121n LEAVE MESSAGE FOR USER n WITH CONFIRMATION

This command is basically the same as command 120 but confirms who the message is being sent to before the five second tone is issued. If user **n** has recorded an out going message it will be played before the five second tone prompt.

If no OGM is present for user **n** the repeater phrase number 27 is announced "LEAVE A VOICE MESSAGE FOR". If the repeater is not keyed up during the tone prompt, the command is cancelled.

122 READ UNREAD MESSAGES *

After logging on to the repeater you may read any new unread messages. Messages are replayed on a first in first out basis. As a message is being replayed, the following options are available by keying the transmitter and entering the following commands:

1 - replay previous message
2 - replay current message from beginning
3 - skip to next message *
5 - announce date and time message was sent
8 - discontinue message playback

123 READ ALL MESSAGES

After logging on to the repeater you may read all messages saved for you on a last in first out basis (newest to oldest). As a message is being replayed, the following options are available by keying the transmitter and entering the following commands:

1 - replay previous message
2 - replay current message from beginning
3 - skip to next message *
5 - announce date and time message was sent
8 - discontinue message playback
0 - permanently erase current message

ie: 123 reads all messages addressed to the user that is logged on
1230 reads all general messages. General messages are considered to belong to USER0.

* simply keying the transmitter during a message playback will also skip to next message.

124 CLEAR ALL MESSAGES

After logging on to the repeater a user may clear all messages that are unread or were saved for them. At the tone the user must key the transmitter and send 0 to complete the command. **PCRC/2**™ will respond "COMMAND COMPLETE".

Allowing the tone prompt to complete without issuing the 0 will cancel the command. **PCRC/2**™ will respond with "CANCELLED".

125n ANNOUNCE MESSAGE STATUS

This feature is useful for determining whether there are any unread messages for user **n**. If the parameter is not supplied, the default is the logged on user.

PCRC/2™ will respond with either "MESSAGE PENDING" or NO MESSAGES PENDING.

Example:		
	12512	see if messages are pending for user 12
	125	see if messages are pending for the logged on user

126n ANNOUNCE MESSAGE STATUS

This command can be used to determine if a message sent by the logged on user has been read by user **n**. **PCRC/2**™ will respond with either "MESSAGE PENDING" or "NO MESSAGES PENDING"

127[n] ANNOUNCE CALLS OF USERS WITH MESSAGES PENDING

The call letters of users with messages pending will be announced as they are initialized in the USER.SRC file. The optional **n** parameter can be used to change the content of the announcement based on the number of users with messages pending. If there are many users with unread messages the announcement will be quite long. The list limiting option becomes very useful.

The following examples assume that 10 users have unread messages:

127	causes all 10 calls to be announced following repeater phrase 26 "MESSAGES PENDING FOR..."
1279	causes repeater phrase 28 to be announced "THERE ARE SEVERAL MESSAGES PENDING, PLEASE READ MAIL". Phrase 28 is issued whenever there are messages pending for more than **n** users, or in this case, 9 users.

128n[*0] DELETE PENDING STATUS OF MESSAGES n DAYS OLD

The short form of the command 128n command does not delete messages. It purges the message pending status of stale messages. Once purged, these messages will not be announced as pending with the 127 command.

The complete form of the command will delete all messages that are **n** days old. This command should be issued once a day to purge stale messages from the system. A scheduled event can be used to automatically execute this function.

Days are calculated with respect to midnight. When a message is created it is already one day old.

1284	will purge the message pending list of all messages that are 4 or more days old.
1284*0	will delete all messages that are 4 or more days old.

1300 ANNOUNCE USER# LOGGED ON

PCRC/2™ will announce the user number of the user that is currently logged on.

1301 ANNOUNCE USER NAME LOGGED ON

PCRC/2™ will announce the name of the user that is currently logged on. The name will be spelled out if the user has not personalized their logon. See RECORD USER NAME.

1302 ANNOUNCE CALL LOGGED ON

PCRC/2™ will play the call recorded in the user directory for the user who is currently logged on, from information stored in the user file or the voice file generated by the RECORD USER CALL command.

131[n[*m]] ANNOUNCE USERn CALL

The **n**th entry of the user directory will be played to announce the call letters and user number of the user selected. The wildcard *, may be used to recite the entire user directory.

When two parameters are specified, the call letters and user numbers of users in the selected range are announced inclusive.

PCRC/2™ will spell out the user's call letters as initialized by the Sysop if the voice file generated by RECORD USER CALL is not available.

13112	Announces "USER 12 IS KA2UGZ"
13112*15	Announces "USER 12 IS KA2UGZ USER 13 IS KA2UJS USER 14 IS KA2ZEV USER 15 IS N2NVY"

1320 RECORD USER NAME

MAXUSERINFO

After a new user is initialized by the Sysop, and is assigned a user number and password, the user will supply certain personal information that will be stored in the user directory.

After the command is entered **PCRC/2™** will emit a five second tone. The user should key the microphone during the tone and supply their name.

The user must logon to the repeater before administering this command.

1321n ANNOUNCE USERn NAME

The **n**th entry of the user directory will be played to announce the name of the user selected.

1322n DELETE USERn NAME

The voice file recorded with the 1320 command by user **n** will be deleted. Subsequent inquires with the 1321 command will cause **PCRC/2™** to spell out the name found in REPEATER.CFG.

PCRC/2™ will respond to this command with a five second tone prompt. The user must key the transmitter and send 0 to complete the command. **PCRC/2™** will respond "COMMAND COMPLETE".

Allowing the tone prompt to complete without issuing the 0 will cancel the command. **PCRC/2™** will respond with "CANCELLED".

1330 RECORD PERSONAL INFO

MAXINFO

After the Sysop initializes a user number and password for a new club member, the member will supply certain personal information for the user directory.

After the command is entered, **PCRC/2™** will emit a five second tone. The user should key the microphone during the tone and supply a brief introduction message to be stored in the user file.

The user must logon to the repeater before administering this command.

Example: "Hi this is Joe Amateur KA2xxx. I am interested in DX, packet, and microwave systems. You can leave a message for me in my repeater mailbox or contact me on the Thursday night net."

1331n ANNOUNCE USERn PERSONAL INFO

This command is used to playback the user information stored by the 1330 command. It is intended to help orient new users with the interests of other club members.

1332n DELETE USERn PERSONAL INFO

The voice file recorded with the 1330 command by user **n** will be deleted.

PCRC/2™ will respond to this command with a five second tone prompt. The user must key the transmitter and send 0 to complete the command. **PCRC/2™** will respond "COMMAND COMPLETE".

Allowing the tone prompt to complete without issuing the 0 will cancel the command. **PCRC/2™** will respond with "CANCELLED".

1340 RECORD USER CALL

After logging on to the repeater, the user may personalize their user directory entry with their own voice, replacing the spelled out call initially installed there by the Sysop.

After the command is entered **PCRC/2™** will emit a five second tone. The user should key the microphone during the tone and speak his call as he would like it recorded in the user file.

1341n ANNOUNCE USERn CALL

The **n**th entry of the user directory will be played to announce the call letters of the user selected. The wildcard *, may be used to recite the entire user directory.

1342 DELETE USER CALL

After logging on to the repeater, the user may erase their entry in the user directory that was recorded with the 1340 command.

PCRC/2™ will respond to this command with a five second tone prompt. The user must key the transmitter and send 0 to complete the command. **PCRC/2™** will respond "COMMAND COMPLETE".

Allowing the tone prompt to complete without issuing the 0 will cancel the command. **PCRC/2™** will respond with "CANCELLED".

135[nnN]nnn DETERMINE USER NUMBER FROM CALL

PCRC/2™ will look up user call letters and read back the user number or the repeater phrase "NOT FOUND". The user number can then be referenced when sending voice mail.

The call letters are spelled out using the following keypad shaped table as reference:

1	ABC 2	DEF 3
GHI 4	JKL 5	MNO 6
PQRS 7	TUV 8	WXYZ 9
	0123456789 0	

Each character in the user call is represented by two key strokes. Letters are represented by the key that they are on followed by their position on that key. Numbers are always zero filled. The letter 'A' is '21', 'B' is '22', '2' is '02', etc.

For example, to find the user number of KA2UJS, enter the following command string:

135 52 21 02 82 51 74

This command will also look up all calls that have matching substrings:

For example: 135 82 51 74 would find all users with the UJS suffix;
KA2UJS, KA3UJS, VE3UJS, WA2UJS, etc.
135 74 would find all users whose calls end in S;
KA2UJS, AA2IS, W1AS

136n RECORD OUT GOING MESSAGE

Voice mail boxes can be programmed to recite a personalized greeting from the mail box owner. The OGM is played prior to the 5 second tone prompt issued by the 121 command.

The **n** parameter is used to select recording options:

n = 0 record the OGM
n = 1 play the OGM
n = 2 delete the OGM

When n=2, **PCRC/2**™ will issue a five second tone prompt. The user must key up during the tone prompt and type a 0 to confirm the deletion of the OGM.

DIAGNOSTIC TESTS

140 VOICE COVERAGE TEST

This test will record an incoming message to a temporary buffer, then immediately play back the message. It will give the user some idea of how well the repeater hears them. Of course the signal is further degraded on the trip back from the repeater!

After the command is entered **PCRC/2™** will emit a five second tone. The user should key the microphone during the tone and speak their test message which can be a maximum of 30 seconds. If the recording exceeded 30 seconds, **PCRC/2™** will issue an alert tone.

141nnn...n TOUCH TONE TEST INPUT

PCRC/2™ announces the digits that follow the command. The ## string must be used to represent a single # key.

Example: 141123456 causes **PCRC/2™** to read back "one two three four five six"

142nnn...n TOUCH TONE TEST OUTPUT

PCRC/2™ regenerates the digits that follow the command. Each tone lasts for 100ms and is separated by 100ms of silence. The ## string must be used to represent a single # key.

Example: 142123456 causes **PCRC/2™** to generate a string of touch tones 123456

143n SET DEBUG LEVEL (0/1/2) DEBUGFLAG

The **PCRC/2™** system supports two levels of run time diagnostics. When enabled, both of these levels decrease the operating efficiency of the repeater. When level **1** is selected, all commands embedded in batch files and function keys are displayed on the control screen. The lower right corner of the control screen will display the internal stack parameters.

When level **2** is selected, all embedded commands are displayed and **PCRC/2™** will announce each command (except 99nnn commands) before they are executed.

When no diagnostics are required level **0** is selected.

PAGE

PCRC/2™ supports two tone, 5/6 tone, and DTMF pager formats. The correct pager format and reed information is stored for each user in the USER.SRC file. See Appendix B for a table of frequencies. The pager format is specified by issuing the proper command.

For voice/tone pagers issue the command, wait for the tones to be transmitted which will open up the pager squelch, then speak your voice page over the air.

150n PAGE USER n

The issued command causes the specified user's pager to be activated. The user file contains a string representing the appropriate **PCRC/2™** MANUAL PAGE command.

MANUAL PAGE

The manual page is useful for testing pager tones, manually opening and closing tone operated links, or manually paging users. A tone table has been provided in Appendix B.

The frequencies to be generated are entered in hertz and separated by *.

Example: 151707*399 generates a 2 tone page for reeds 124 and 144

151f1*f2 MANUAL PAGE, TWO TONE, 1 SEC/3 SEC

Issues a sequential two tone page where the duration of the first tone will be 1 second, and the second tone three seconds.

152f1*f2 MANUAL PAGE, TWO TONE, 2.7 SEC/.8 SEC

Issues a sequential two tone page where the duration of the first tone will be 2.7 seconds, and the second tone 800ms.

153f1*f2 MANUAL PAGE, TWO TONE, .4 SEC/.8 SEC

Issues a sequential two tone page where the duration of the first tone will be 400ms, and the second tone 800ms.

154f1 MANUAL PAGE, GROUP

The group page command issues the group tone for 8 seconds.

155(pf)*f1*f2*f3*f4*f5*(f6) MAN. PAGE 5/6 TONE

This command supports the variants of the 5/6 tone page. If the prefix frequency (pf) is present, it will be generated for 690ms, followed by 45ms of silence, followed by 33ms each for frequencies one through five. If frequency six is provided it will be generated for 45ms.

ie: `155*707*399*425*600*299*707`
generates a six tone page comprised of the first five frequencies for 33ms each and the sixth frequency for 45ms. Note: the **pf** parameter is null since the ***** follows the command. The next example specifies the 690ms prefix followed by 45ms of silence, and 33ms each of frequencies one through five, ending with 45ms of frequency six.

`155299*707*399*425*600*299*707`

156nnn..n MANUAL PAGE DTMF

PCRC/2™ supports the sixteen standard DTMF tones and generates a string of 100ms tones separated by 100ms of silence between tones. The pound key `#` can be represented by `##`.

TELEPHONE PATCH

An RJ-11 plug is used to interface to the telephone network. Like any **PCRC/2™** command, the Sysop can grant patch privileges to selected users.

One of the most significant features of the **PCRC/2™** autopatch is that the telephone hybrid can be remotely balanced providing full duplex conversations with no feedback!

Although the hybrid was designed with FCC Part 68 specifications in mind, it has not been submitted for qualification. Part 68 requirements are specifications established by the FCC as the minimum acceptable protection communications equipment must provide the telephone network.

Although we believe that the **PCRC/2™** hardware poses no threat to the telephone network, **PCRC must recommend operation of the autopatch behind a PART 68 registered PBX to insure operation within the letter of the law.** The telephone companies can request that you remove any equipment that is not Part 68 qualified.

SPEED DIALS

PCRC/2™ doesn't really have speed dials. At least not the kind that you may be accustomed to. Each user does have their own personal function keys, and their own personal batch files.

Function keys and batch files can contain any **PCRC/2™** commands, including those that dial the phone. See the 191 and 250 commands for details.

TOLL RESTRICTION

Toll restriction is based on the Service Class (SC) assigned to the user by the Sysop. The TOLLREST= keyword in the USER.SRC file is used to define a SC for each user with autopatch privileges. If no SC is specified, SC 4 is defaulted.

A SC of 0 performs no checking of the dialed number, does not apply a dial prefix, and allows dial through.

The string of digits that represent the phone number in the 160 command are interrogated according to the SC assigned to the user. If the string is acceptable, **PCRC/2™** will place the call. If the string is invalid, access to the phone line is denied.

The phone service provided by many telephone companies will automatically cycle back and provide a second dial tone when the caller remains on the line after the party they called hangs up. Once presented with a second dial tone, the caller is in a position to place a call that bypasses the toll restrictions that **PCRC/2™** would normally enforce on an initial call.

The DIALTHRU variable which can be set for each user in USER.SRC, specifies whether a user is allowed to send touch tones as part of their telephone conversation. When DIALTHRU=NO is selected, any touch tone digits sent during a conversation, or any that are sent during a second dial tone, will cause **PCRC/2™** to automatically terminate the patch.

SC	Allowed	Denied
0	All Calls, DIALTHRU	None
1	All Calls	None
2	Long distance & local calls	International calls & EXCLUDED exchanges
3	Local calls & SELECTED area codes	International, long distance & EXCLUDED exchanges
4	Local calls	International, long distance & EXCLUDED exchanges

A list of SELECTED area codes and EXCLUDED exchanges are stored in the TOLLREST.DAT file. The SELECTED list pertains to SC 3 and is useful in dense metropolitan areas that are serviced by more than one area code.

For example, New York City has more telephone numbers issued than can be contained in one area code. Since NYC has more than one area code, a repeater in the 212 area code should SELECT the 718, 914, and 516 area codes to allow SC 3 users access to the entire regional calling area.

Similar situations will exist when a repeater boarders on two states. By listing the permitted area codes for the two states, so called 'local calls' are permitted while maintaining toll restriction for long distance calls.

The EXCLUDE list should contain any three digit exchanges that are not valid. This feature can be used to block access to exchanges that offer premium information services (time, weather, sports) or chat lines. Below is an example of TOLLREST.DAT:

```
SELECTED AREA CODES
718
914
516
EXCLUDED EXCHANGES
958
976
```

The file RB0_EMR.RBT is executed whenever *911 (see command) is encountered. This file should contain the necessary steps to contact emergency services. It could simply engage the autopatch or initiate a sequence of commands necessary to open the squelch of an emergency receiver at the local police station.

CALL LOG

All outgoing call activity is logged in a DOS file **SMDR.DAT**. The recorded information is useful when the telephone bill will be divided amongst users based upon individual usage. The following is an extract of an actual SMDR.DAT file.

```
DATE          TIME       # CALLED    USER #
04-09-1991,20:22:51,1605551212,3,STARTCALL
04-09-1991,20:23:02,1605551212,3,ENDCALL
04-10-1991,08:31:48,1608005551212,3,STARTCALL
04-10-1991,08:31:56,1608005551212,3,ENDCALL
```

160 ANSWER TELEPHONE (REVERSE PATCH)

DIALPREFIX PREFIXPAUSE AUTOANSCNT

Calls placed to the phone number attached to **PCRC/2™** (reverse patch) can be enabled to ring over the air with a warble pattern. Anyone logged onto the repeater who has patch privileges may answer the incoming call as the control operator.

If the patch is ringing over the air when a user with patch privileges logs on, the patch is automatically answered.

160nnn...n PLACE PHONE CALL

PCRC/2^{TM} will evaluate the string of digits following the command to determine if they meet the toll restriction requirements for the logged on user. If the string is an allowable phone number, **PCRC/2**^{TM} will announce the digits to be dialed then pause up to five seconds for confirmation.

If the user keys up the transmitter anytime during the digit read back or confirmation pause, the digits will be regenerated and the call will be placed.

The `**` command is used to terminate the call. If **PCRC/2**^{TM} is used behind a PBX or with CENTREX service, DIALPREFIX and PREFIXPAUSE variables must be set in the REPEATER.CFG file.

Example: `1605551212` place call to 555-1212

161 REDIAL LAST NUMBER

The last number entered during the current user session can be redialed. This feature is handy after receiving a busy signal upon your first attempt at dialing a number.

162n/163n DIAL USERn AT HOME/WORK

The phone number is retrieved from the USER.SRC file, **PCRC/2**^{TM} will then place the call as if it was dialed directly.

164 PATCH TIMER EXTEND

MAXPHONETIME

The autopatch will automatically terminate a call after the variable MAXPHONETIME is counted down. This provides for positive call termination should the radio operator loose contact with the repeater by traveling beyond the repeater's range, encounter interference or a dead HT battery!

PCRC/2^{TM} will emit a 'beep' at one minute intervals during the call, and three beeps to signal when only one minute remains. If the timer extend command is received prior to automatic termination, the timer is reset to MAXPHONETIME.

165 FLASH HOOK

FLASH

A flash hook can be generated to access PBX, CENTREX, or custom calling features (call waiting, conference call etc). The default flash time is 500ms and is set in the REPEATER.CFG file.

166c[*t] ANSWER PATCH ON c RINGS

AUTOANSCNT

This feature is used to select the number of rings **PCRC/2™** should count before answering an incoming call.

Example: 1664 instructs **PCRC/2™** to answer incoming calls after the forth ring.

1660 instructs **PCRC/2™** to disable the auto answer feature.

The optional **t** parameter can be used to specify an expiration time expressed in seconds.

Example: 1665*300 instructs **PCRC/2™** to answer incoming calls on 5 rings for the next 5 minutes, then revert to the previous setting.

Setting the **t** parameter to zero defines whether **PCRC/2™** will announce incoming calls by ringing over the air.

Example: 1655*0 answers on five rings but does not ring over the air.

The patch is not automatically connected to the transmitter when auto answer is enabled. The transmitter is disabled, and USER0 is logged on to the repeater. All other USER0 commands are operational.

Once logged on, the user may retrieve voice mail, page other users, send voice mail, and access features just as they would if they accessed **PCRC/2™** over the air.

If the user has patch privileges, they may activate the transmitter with a 160 command.

Commands issued over the phone are terminated with ** in place of dropping carrier, and ** by itself causes **PCRC/2™** to hang up.

1670/1671 AUDIBLE RING TRANSMITTED ENABLE/DISABLE

When the reverse patch is accessed **PCRC/2™** can be programmed to turn on the transmitter and ring over the air to signal the incoming call. The audible warble tone can be disabled if no signaling is desired.

168 BALANCE TELEPHONE HYBRID CIRCUIT

PCRC/2™ is capable of full duplex autopatches when two transmitters are used (see full duplex autopatch). The hybrid circuit can be remotely balanced to eliminate sidetone and feedback.

After issuing the balance command from the main repeater input (this command can not be issued from the phone line) **PCRC/2™** will transmit a tone while simultaneously changing the setting of the digital pot used in the hybrid circuit. When the tone is at it's lowest level, key up to freeze the digital pot setting and complete the circuit balance for the current phone line characteristics and audio levels.

The hybrid should remain balanced as long as the phone line characteristics and audio levels remain unchanged.

169nn..nn SET CUSTOM HANGUP CODE

The custom hang up string (nn..nn) replaces the standard issue ** hangup code until the user logs off. To keep hang up codes private, the user may wish to issue the command as part of the user logon batch file RBu_2.RBT.

PRIVATE LINE TONES

PRIVATELINEn, PRIVATLINETONEn

PCRC/2™ adapts the optional Communication Specialist TS-32 CTCSS module to decode up to four of the thirty two software selectable sub audible tones used to enable the repeater transmitter.

WARNING: The TS-32 switches MUST remain in the OPEN or OFF position to prevent damage to the **PCRC/2™** hardware and to allow **PCRC/2™** to control the tone selection via software.

You can instruct **PCRC/2™** to attempt to decode up to four different CTCSS tones on a rotating basis. Each tone will be sampled in turn. **PCRC/2™** maintains two CTCSS lists. The first is the tone table which contains the four tones selected, the second is a prioritized list where the last tone decoded will be the first one tried.

The worst case is when the PL you require is last on the rotating queue. On the initial contact with the repeater, it will be necessary to key down for at least two seconds to allow the TS-32 to sample all four tones. After a tone is successfully decoded, it will be placed on the top of the queue and all subsequent contacts will open the transmitter immediately.

The transmitter can be opened with various combinations of PL and carrier as explained with the following commands.

1700 DISABLE PL

PRIVATELINE

The transmitter will be carrier operated when CTCSS is disabled.

If only one CTCSS tone is required, and you desire to hardwire it, select the tone to decode via the dip switches, and instruct **PCRC/2™** to DISABLE PL.
WARNING: disconnect the five dipswitch wires to prevent hardware damage to **PCRC/2™** when hardwiring CTCSS tones.

1701 CTCSS AND PL TO OPEN ONLY

PRIVATELINE

Use this option when CTCSS and carrier are required to initially open the transmitter, following with carrier operation until the transmitter drops.

1702 CTCSS AND PL WHENEVER COS DROPS

PRIVATELINE

CTCSS and carrier are required together to initially open the repeater, and after each carrier drop.

CTCSS and carrier must be present to initially open the repeater. CTCSS is then ignored and the repeater is carrier operated until carrier is dropped. If carrier returns during the transmitter hangtime without CTCSS, the transmitter drops.

1703 PL ONLY

PRIVATELINE

Use this option when CTCSS alone will be used to initially open the transmitter and to keep it open there after.

This option ignores the presence or absence of carrier. Configured for this mode, almost any radio or handie talkie can be interfaced to **PCRC/2™** by connecting the receive audio to both RECAIN and UNFILAIN.

1710n/1711n DISABLE/ENABLE PL n

PRIVATELINE

PCRC/2™ may be instructed to disable or enable any of the four tones stored in the CTCSS TONE TABLE.

172ncc SET TONE TABLE ENTRY n TO cc

PRIVATELINETONE

This command is used to set up the CTCSS tone table, where **n** is a value from 1-4 and **cc** is an integer value that represents the tone number or the frequency in hertz.

Tone numbers 1-32 represent frequencies between 67.0 and 203.5 hertz. If **cc** < = 32 then it will be treated as a tone number, while values between 67.0 and 203.5 will be considered direct entries for frequency. Appendix C lists Group A tones and frequencies.

When entering direct frequencies the decimal point is left out.

Example:	17241148	sets TONE TABLE location 4 to 114.8 Hertz, 2A, tone # 16
	172316	sets TONE TABLE location 3 to 114.8 Hertz, 2A, tone # 16

COURTESY TONES

PCRC/2^{TM} provides 10 predefined courtesy tones (1-10) and a provision for the user to record and use 89 more of their own (11-99). The generated tones can be sounds, a musical note, words, or short phrases recorded and stored to disk.

Courtesy tones will be generated just after COS drops but before the transmitter turns off. A different tone can be assigned to each receiver (main, AUX1, AUX2).

Distinct courtesy tones are used to indicate special operating environments defined by the user. For example, different tones can be specified to audibly discern when a user is/is not logged on.

180xn SET NO USER LOGGED ON COURTESY TONE FOR RECVR x TO n

Use this command to select courtesy tones that will be sent as a result of COS dropping when no user is logged on for each receiver where n is the required tone (1-99) and:

x=0 is the main receiver   x=1 is AUX1   x=2 is AUX2

ie 180220 selects tone 22 as the main receiver courtesy tone.

181xn SET USER LOGGED ON COURTESY TONE FOR RECVR x TO n

This command is used to specify the courtesy tone that will be sent as a result of COS dropping when a user is logged on for each receiver where n is the required tone (1-99) and:

x=0 is the main receiver   x=1 is AUX1   x=2 is AUX2

182n RECORD COURTESY TONE n

After the command is entered, **PCRC/2^{TM}** will emit a five second tone. The user should key the microphone during the tone and record the courtesy tone or message.

Only entries 11-99 are valid for user defined tones. A 'tone' can be a musical note, a sound, or a short spoken phrase such as 'over to you'.

183n PLAY COURTESY TONE n

Use this command to playback recorded courtesy tones where **n** = 1-99

184xn SET ACTIVE USER COURTESY TONE

Use this command to modify the tone played when a user is logged on. This selection is reset when the user logs off.

Placing this command into the logon batch file (RB2_n.RBT) will select the distinctive courtesy tone each time the user logs on.

185f*d[*f*d*...f*d] CREATE TONES

This command allows direct access to the 8253 timer used to make the page and courtesy tones by specifying a frequency in Hz, and a duration in milliseconds. It is possible to create a programmable pause by selecting zero as a frequency.

Example: 1851000*1000 plays a 1 kHz tone for 1 second.
1850*3000 causes a 3 second pause

FUNCTION KEYS MAXUSERFUNC

Each user may store **PCRC/2™** commands as function keys. Although the syntax allows an infinite number of function keys, the Sysop may limit the number available for each user. Each user maintains their own unique list of function keys that are available to them when they log on.

The * acts as a delimiter to separate the function number from the command. The command will be parsed out and stored by the function number parameter supplied. To invoke a function key, the # followed by the function number is entered.

ie: #5 invokes function five

191n*c DEFINE FUNCn as c FUNCTIONPATH

Function **n**, where n is any string of characters (0-9, A-D), is defined to be the command string **c**. If the command delimiter key #, or parameter separator *, is required it must be substituted for by ## or **.

Example:

19110*1030	defines function 10 to be **PCRC/2™** command 1030 (Repeater Id)
191AA*1605551212	defines function AA to dial the phone number 555-1212
1915*1030##1030	defines function 5 to id twice; notice that ## is required as a command delimiter

192n READ FUNCn

This command will read back the contents of the specified function key. No read back will occur if that function key has not been defined.

193n DELETE FUNCn

After issuing the command **PCRC/2™** will respond with a five second tone prompt. Key up during the prompt and type 0 to delete the specified function.

VOICE/SOUND RECORDER

Audio files can be created and stored for later recall, and are stored with an extension of **.SPC**. Recorded audio files can be played back from batch files, or used as help files for repeater features such as introductions before morse code practice or emergency service information..

The RECORD/PLAY commands are useful when defining messages that result from a hardware event taking place. For example, if one of the hardware inputs were monitoring the repeater cabinet temperature, you might want **PCRC/2™** to announce "WARNING, EXCESSIVE CABINET TEMPERATURE", and then announce "TEMPERATURE BACK TO NORMAL" when the condition has changed.

201nn...nn RECORD AUDIO FILE

Use this command to record audio, sounds, or prompts that are to be saved to the DOS file RRECnnnn.SPC.

After the command is entered, **PCRC/2™** will emit a five second tone prompt. Key up during the tone prompt to record.

If the audio file already exists, the prompt will be a warble tone. Key up during the warble tone prompt and type 0 to enable overwriting. **PCRC/2™** will emit a five second tone prompt. Key up during the tone prompt to record. The recording time allowed is a function of disk space and is not restricted by **PCRC/2™**.

202nn...nn PLAY AUDIO FILE

PCRC/2™ will play back recorded audio file RRECnnnn.SPC in response to this command.

203nn...nn ERASE AUDIO FILE

After issuing the command **PCRC/2™** will respond with a five second tone prompt. Key up during the prompt and type 0 to delete the audio file RRECnnnn.SPC.

SET AUDIO LEVELS

All **PCRC/2™** audio adjustments are implemented with digital pots that can be remotely set. Audio levels may be balanced without actually visiting the repeater site.

Each function is referenced by a pot number from the table below. The FREEZE feature insures that adjustments to the phone, receiver, or DTMF audio levels will not result in disabling the repeater. The old levels are restored if you do not (or are unable) to issue the freeze command within 30 seconds.

The pots initially powerup at their midpoint. **PCRC/2™** will then adjust them to the settings indicated in the ALEVELS.DAT file. Values in the range of 0-255 are used to achieve proper audio levels. The least gain is attained with a value of **0** while the most gain is attained with a value of **255**.

The pot values can also be changed from the PC keyboard using the UP/DOWN/LEFT/RIGHT keys. The LEFT/RIGHT keys select the pot and the UP/DOWN keys increment or decrement the pot value. Both settings are found in the lower right corner of the control screen. The following is an example of the DOS file ALEVELS.DAT:

```
POT 1 VALUE = 128       ! audio from receiver
POT 2 VALUE = 128       ! audio to transmitter
POT 3 VALUE = 120       ! audio from voice board
POT 4 VALUE = 255       ! audio to voice board
POT 5 VALUE = 128       ! audio from auxiliary 2
POT 6 VALUE = 128       ! audio to auxiliary 2
POT 7 VALUE = 128       ! audio from auxiliary 1
POT 8 VALUE = 248       ! audio to auxiliary 1
POT 9 VALUE = 80        ! output from touch tone encoder
POT 10 VALUE = 128      ! input to touch tone decoder
POT 11 VALUE = 128      ! audio from autopatch
POT 12 VALUE = 128      ! audio to autopatch
POT 13 VALUE = 128      ! audio from tone generator
POT 14 VALUE = 128      ! phone balance circuit
```

210/211n*x DECREASE/INCREASE POT n BY x

This command can be used to decrease or increase the current setting of an audio level.

Example: 2105*10 decreases the level of the auxiliary 2 audio pot (#5) by 10

212n*x SET POT n TO x

This command is used to select a specific value for a pot setting.

Example: 2125*100 sets the level of pot 5 to 100

213n ANNOUNCE LEVEL n

PCRC/2™ will read back a value between 0 and 255 which represents the current setting of pot n.

214 FREEZE POT LEVELS

This command must be issued to validate pot settings after they have been remotely changed. If the command is not issued within 30 seconds the former pot values are restored.

PCRC/2™ utilizes this feature to prevent the repeater from becoming incapacitated if a wrong value is entered in the above commands.

215 RESTORE PREVIOUS LEVELS

This command will restore all the pot values to their previous saved state.

REPEATER PHRASE MAINTENANCE

220n ANNOUNCE PHRASE n MAXRMSG

This command will announce the repeater phrase indicated by n.

1. short id.
2. MESSAGE PENDING
3. THE TIME IS
4. INVALID COMMAND
5. COMMAND COMPLETE
6. MESSAGE BUFFER FULL
7. INVALID PARAMETERS
8. TODAY IS
9. HUNDRED HOURS
10. MINUTES
11. INVALID USER CODE
12. INSUFFICIENT FILE SPACE
13. NO ACTION
14. 911 emergency message
15. CANCELED
16. REPEATER CLEAR
17. OVERWRITE CONFIGURATION DISABLED
18. AUTOPATCH CLEAR
19. AUTOPATCH
20. CALL COMPLETE AT
21. BATCH OVERFLOW
22. TOLL RESTRICTION VIOLATION
23. RESTORED AUDIO LEVELS
24. TRANSMIT TIMEOUT
25. NOT FOUND
26. MESSAGE PENDING FOR
27. LEAVE A MESSAGE FOR
28. THERE ARE SEVERAL MESSAGES PENDING PLEASE READ MAIL
29. NO MESSAGES PENDING
30. OVERWRITE CONFIGURATION ENABLED

31-39 reserved for future expansion
40-49 rotating id messages

221n RECORD REPEATER PHRASE n

MAXRMSG

Use this command to modify a **PCRC/2™** phrase. After the command is entered, **PCRC/2™** will emit a five second tone. The user should key the microphone during the tone and begin recording.

Phrase 1 should always be recorded to properly id the repeater by voice. This should be a very short id; just the sponsors call: "KA2UGZ REPEATER". Longer id's should be recorded in phrases 40-49. Be creative! Put in some old standbys and some distinctive ids:

> "The KA2UGZ repeater *speaks for itself* from Bohemia Long Island"
>
> "From Jamaica Bay to Montauk Pt and points north and south, this is the KA2UGZ repeater, Bohemia Long Island"
>
> "With links from Vermont to the Virgin Islands this is the WA2SNQ repeater system, Dix Hills New York"
>
> "Seasons's Greeting's from the Hook and Ladder Amateur Radio Club"

Most other phrases will not need to be changed unless you are configuring **PCRC/2™** for a language, voice, or dialect other than the one supplied by the factory.

222n RELOAD DEFAULT PHRASE n

The factory phrase can be reloaded to replace any user defined phrases.

223/224n DISABLE/ENABLE REPEATER PHRASE

At times it may be desirable to disable certain repeater phrases.

Example: 2235 Disables the repeater phrase 5, COMMAND COMPLETE

Phrases such as COMMAND COMPLETE should be temporarily disabled at the beginning of a batch file of **PCRC/2™** commands, and enabled at the end of the batch file for seamless operation. This prevents the announcement of the phrase as each command in the batch file is executed.

Rotating id's (phrases 40-49) must be enabled to be considered by the 1031/1032 commands.

DOS SHELL

The ability to suspend the operation of the repeater and transfer control to a DOS program is an extremely powerful and flexible **PCRC/2™** feature. It allows you to integrate hardware and software packages into the repeater without changing the **PCRC/2™** software.

Some common uses are control of antenna rotors, relays, weather station instruments, remote file maintenance over the modem line etc.

A .BAT file could be created to backup all the user files to disk or tape to enable a speedy recovery in the unlikely event of a hardware failure.

All **PCRC/2™** shell file names are in the format RSHELLpp.BAT, RSHELLpp.COM, or RSHELLpp.EXE where pp is a two digit value.

The TSR program WD.COM must be used for the SHELL command to work. The AUTOEXEC.BAT file should initialize the WD TSR. Once control is passed from the **PCRC/2™** program the on board watchdog reset circuit must be serviced to prevent system resets.

Upon normal termination, control is resumed by **PCRC/2™**.

230s*t*ff(*param...*param) EXECUTE RSHELLpp.BAT/.COM/.EXE

s = number of seconds program is expected to run before normal termination by user. If normal termination is not completed in s seconds, the watchdog will reset the system.

t = 0/1 if transmitter is to remain off/on during shell execution.

ff = indicate the RSHELL file name to transfer control to.

param = any parameter(s) to pass to the RSHELL file. If * is required as part of a parameter string ** must be used instead.

Example: `230240*1*1`

Executes the RSHELL1.BAT file for a maximum period of 4 minutes (240 seconds), with the transmitter on. Upon normal completion control is passed back to **PCRC/2™**.

Example: `230360*0*1*A*B*C`

DOS is passed the string **RSHELL1 A B C** which is active for a maximum of 6 minutes (360 seconds) with the transmitter off.

For clarity it is suggested that you refrain from using the same root name for files with the .BAT, .COM, and .EXE extensions. If you do use the same root filename, **PCRC/2™** will execute RSHELLpp commands using the following hierarchy: .BAT, .COM, .EXE.

CONFIGURATION FILE MAINTENANCE

The **PCRC/2**$^{\text{TM}}$ configuration file REPEATER.CFG contains the factory parameters that can be modified.

The configuration file is organized so that only one feature is described per line. A feature can be a flag or a value.

Flags are used to indicate whether a feature is enabled or disabled at boot time. A value resembles a flag but has a setting other than TRUE or FALSE.

PCRC/2$^{\text{TM}}$ allows multiple configuration files to exist on the same system. This allows multiple repeater personalities, which can be switched as required.

At initialization **PCRC/2**$^{\text{TM}}$ will attempt to load the configuration information from the REPEATER.CFG file. If it is unsuccessful, it will attempt to load the FACTORY.CFG file. If this too is unsuccessful, **PCRC/2**$^{\text{TM}}$ will reboot the PC and try again.

If you wanted the repeater to operate differently at night or on weekends or during a net meeting, you would define and load a configuration for each of these situations.

The following is an example of the DOS file REPEATER.CFG:

```
PRIVATELINE1 = TRUE
PRIVATELINE2 = TRUE
PRIVATELINE3 = FALSE
PRIVATELINE4 = FALSE
COMPORT = COM1
BAUDRATE = 2400
        etc.
```

2400n LOAD AND RUN n.CFG

PCRC/2$^{\text{TM}}$ will activate a previously defined user configuration file. If this is unsuccessful, **PCRC/2**$^{\text{TM}}$ will load the information found in the REPEATER.CFG or FACTORY.CFG file. If this too is unsuccessful, **PCRC/2**$^{\text{TM}}$ will reboot the PC and try again.

Example: 240010   Activates 10.CFG

2401n SAVE CONFIGURATION n.CFG

This command saves the current configuration loaded in memory to a file n.CFG.

2410 LOAD DEFAULT CONFIGURATION

Use this command to reload and run the configuration that is enabled at boot time (REPEATER.CFG).

2411 SAVE DEFAULT CONFIGURATION

This command saves the current configuration loaded in memory as the default file which will be loaded at boot time. Use this command after you have customized the factory configuration to create REPEATER.CFG.

If the default configuration already exists, **PCRC/2™** will announce repeater phrase 13, NO ACTION and the configuration will not be saved. See command 243.

242 LOAD FACTORY CONFIGURATION FILE

Loading the FACTORY.CFG file restores all default configuration parameters

243 ENABLE CONFIGURATION OVERWRITE

This command must precede a SAVE CONFIGURATION command if that file already exists.

Example: If you wanted to modify the previously defined configuration 10.CFG, the steps to follow would be:

240010	Load and run the configuration
	Make changes
243	Enable overwrite of existing configuration, **PCRC/2™** announces repeater phrase 17, "OVERWRITE CONFIGURATION ENABLED".
240110	Save configuration 10.CFG

BATCH COMMAND FILES

Each user may define macro files of **PCRC/2™** commands that can be executed in a batch mode. Batch Commands are similar to function keys, which are single command oriented.

The command will be parsed out and stored by the batch number parameter supplied.

The Sysop may want a batch command that will prepare the repeater for routine maintenance by enabling the modem, and disabling the transmitter. Other users may define batch commands for commands that they issue routinely.

A combination of 202 and 120 commands would form a useful batch file to instruct guest users to provide club registration information in the form of a message for the Sysop. Consider the following example:

201AC	Logon as the SUPERUSER and record audio file RRECAC.SPC: "Thank you for your interest in our repeater. If you would like a user account of your own, key up during the tone prompt and leave your name, call, and evening telephone number".
1070	Change to USER0 maintaining SUPERUSER privileges.
1912*250103	make a USER0 function key #2 that executes batch file 103
252103	Create a USER0 batch file 103
202AC	Play audio file RRECAC.SPC
1201	Leave a message for USER1, (Control Operator)
**	End batch file creation.

Batch commands that belong to USER0 can contain commands that are not part of the USER0 command set. This allows the sysop to create useful batch files that will be used by the general user population without requiring these commands to be available to them directly.

Batch commands can be created off line with your favorite DOS editor or on line with the CREATE BATCH command.

The following table identifies the special USER0 batch files that are executed by **PCRC/2™** in response to some external stimulus like hardware events or users logging on.

RB0_0.RBT	Executes at boot time, should contain initialization for courtesy tones, aux ports, no activity timers, etc.
RB0_1.RBT	Executes after HANGTIME expires on each transmission from the main transmitter; can be used to id or issue a tail message whenever the transmitter drops.
RB0_10.RBT	Executes when hardware event 1 becomes active; can be used to announce a message pertinent to the event that is monitored. Even numbered batch files from 12-24 are executed for events 2-8.
RB0_11.RBT	Executes when hardware event 1 becomes inactive; Odd numbered batch files from 13-25 are executed for events 2-8.
RB0_30.RBT	Executes when the LINKATTACH bit goes low; can be used to automatically access the repeater from the link.
RB0_31.RBT	Executes when the LINKATTACH bit goes high; can be used to automatically
RB0_42.RBT	Executes prior to the users RBu_2.RBT when users log on; can be used for any house keeping functions.
RB0_43.RBT	Executes after the users RBu_3.RBT when users log off; can be used for house keeping functions like putting the repeater into security sleep mode.

250n EXECUTE BATCH COMMAND n

PCRC/2™ will execute all the commands provided in the file RBu_n.RBT, where u is the user number and n is the batch command number.

251n ANNOUNCE BATCH COMMAND n

Use this command to read back the commands stored in RBu_n.RBT, where u is the user number and n is the batch command number.

252n CREATE BATCH COMMAND n

PCRC/2™ will create a batch command file RBu_n.RBT where u is the user number, and n is the batch command number, and record the string of commands provided.

PCRC/2™ will request a command string using the voice prompt "ENTER COMMAND". During the tone enter the command string digits. Enter only one command per prompt, using ** as the last command.

253n EDIT BATCH COMMAND n

PCRC/2™ will playback each command stored in the batch command, and issue a tone. If you want to change the command, key the transmitter during the tone, and enter the new command.

254n DELETE BATCH COMMAND n

This command erases the RBu_n.RBT file where u is the user number and n is the macro number. When the tone prompt is heard, issue a 0 to confirm the delete.

BSR X-10 INTERFACE

These remote control modules can be used to turn on/off lights, appliances, and other devices attached to the AC wiring. They are marketed by many different companies such as Radio Shack, HeathKit, and Dak.

The **PCRC/2™** feature set is certainly complemented by the ability to operate BSR modules at home or at the repeater site. Some uses include control of air conditioners, electric heaters, fans, lights, controlling power to links and auxiliary receivers, turning on an external modem, etc.

BSR is really a local area network (LAN) implemented over the AC wiring in a house or building. Each module is addressed using a unique a house code and a module number. **PCRC/2™** supports all valid house codes and addresses in it's commands.

House codes range from A-P while module numbers range from 1-16. When entering house codes in **PCRC/2™** commands, use 1 for A, 2 for B, etc.

PCRC/2™ interfaces to the BSR network through the BSR X10 RS-232 interface available from Heathkit or Radio Shack (RS 61-2617).

260/261h*n TURN OFF/ON MODULE WITH HOUSE CODE h AND NUMBER n

Use this command to instruct **PCRC/2™** to turn off/on a module of house code **h** and number **n**.

Example: `26010*1` Turns off module with house code of J and address number 1

2620 SET PC CLOCK FROM BSR CLOCK

The BSR RS-232 controller contains a very accurate clock that can be used to control BSR modules at specific time intervals. This command will cause **PCRC/2™** to request the time from the BSR controller and use it to update the DOS system clock. If the **PCRC/2™** host is an AT, then the CMOS clock value is also updated.

2621 SET BSR CLOCK

This command takes the DOS system time and uses it to update the clock in the BSR RS-232 controller.

263 SET BSR HOUSE CODE

X10HOUSE

Use this command to set the house code that will be stored in the BSR computer interface controller. The house code must be set to control modules from the BSR keyboard. The house code is selected in the REPEATER.CFG file.

PCRC/2$^{\text{TM}}$ will issue a five second tone prompt. Key up during the tone prompt and type 0 to complete the command.

HARDWARE EVENTS

There are 4 input lines available on each standard PC parallel printer port that can be used to monitor events outside **PCRC/2™**. The first four are found on LPT1, and the second four are found on LPT2. Hardware events belong to USER0, and as a result, use the batch files reserved for USER0 to respond to changes on the parallel port.

Hardware events are considered to be active low TTL signals. They have two states: active and in-active. A batch file of commands can be associated with each of the four hardware lines, for each state that they can transition to. The DOS file RB0_10.BAT contains instructions or commands that are to be executed when hardware event #1 changes from the inactive state to the active state. Likewise, RB0_11.BAT is executed when hardware event #1 changes from the active state to the in-active state.

Event	Printer Signal Name and Pin	Active Batch File	Inactive Batch File
1	Busy (Pin 11)	RB0_10.RBT	RB0_11.RBT
2	Paper End (Pin 12)	RB0_12.RBT	RB0_13.RBT
3	Select (Pin 13)	RB0_14.RBT	RB0_15.RBT
4	Error (Pin 15)	RB0_16.RBT	RB0_17.RBT
5	Busy (Pin 11)	RB0_18.RBT	RB0_19.RBT
6	Paper End (Pin 12)	RB0_20.RBT	RB0_21.RBT
7	Select (Pin 13)	RB0_22.RBT	RB0_23.RBT
8	Error (Pin 15)	RB0_24.RBT	RB0_25.RBT

Hardware events can be triggered by simple relay or switch closures. For example, a normally open tamper switch connected to the repeater cabinet door could be used to alert the Sysop that someone is meddling around at the site.

The appropriate RB0_xx.BAT file would contain **PCRC/2™** commands to announce the 'break-in' over the air, page the Sysop, call him at home, etc.

Another use would be to monitor the temperature of the power amplifier with a thermal switch. When high temperature triggered the switch to close, the appropriate batch file could announce the 'temperature warning', and issue a BSR X10 command to turn on a ventilating fan. When the condition clears, the complementary batch file can announce that the temperature is now 'normal' and turn off the fan.

All hardware events should be latched to insure that they are recognized by **PCRC/2™**. A table and a suggested latch hardware schematic is provided in Appendix D.

270n DISABLE HARDWARE EVENT n

This command instructs **PCRC/2™** to ignore transitions that may occur on the selected hardware line. Unused hardware lines should be disabled. Acceptable values for the **n** parameter are 1-8.

271n ENABLE HARDWARE EVENT n HWEVENTnENAB

PCRC/2™ will look for transitions on the hardware line selected. Acceptable values for the **n** parameter are 1-8.

272n ANNOUNCE STATUS OF HARDWARE EVENT n

Use this command to determine if a hardware event is ENABLED or DISABLED. Acceptable values for the **n** parameter are 1-8.

273n ANNOUNCE STATE OF HARDWARE EVENT

The state of a hardware line, ACTIVE or INACTIVE can be determined at any time. Acceptable values for the **n** parameter are 1-8.

274n RESET HARDWARE EVENT

It may be necessary to latch hardware events that require human intervention. For these cases, **PCRC/2™** provides a way to reset the latch manually. Acceptable values for the **n** parameter are 1-8.

PCRC/2™ will provide a 1 second active low pulse on Pins 2,3,4, and 5 of the printer port to reset corresponding latched events 1,2,3, and 4. Refer to Appendix D for a suggested schematic.

SCHEDULED EVENTS

PCRC/2™ provides a means to automatically execute repeater commands on a predetermined schedule. There are provisions for single and reoccurring events, and events that can be scheduled for every minute, every day, every other day etc. Events are identified by the number assigned to them by **PCRC/2™**.

At the last moment, the decision to execute the event as scheduled, can be made with respect to the state of the transmitter. Events can be programmed to execute only if **PCRC/2™** is repeating, is not repeating, or unconditionally.

This powerful command can be used to execute macros, reconfigure the controller profile, start morse code practice, bring up the links, or reset the DOS clock at predetermined times. The events are stored in the DOS file SWEVENTS.DAT. The format of the sample file below is explained in command 281.

```
01-01-1991,12:00:00,115,2,103#1100
01-11-1992,18:56:00,0,2,103#103#103
```

280n ANNOUNCE EVENT n

Reads back the command(s) associated with event **n**. The * can be used to read back all events.

281(mmddyyyy)*hhmmss*rxx*n*cmd(##cmd) SET EVENT

The minimum syntax of this command contains 5 main fields. The first field is the command itself 281. The second field is the date field. If the date field is left blank, today's date will be used.

The third field contains the time in military format. The forth field is a codeword that describes the repeat cycle.

When **r=0**, a single event is described. Single events do not repeat.
If **r=1**, a reoccurring event is described, repeating every xx minutes.
If **r=2**, a reoccurring event is described, repeating every xx hours.
If **r=3**, a reoccurring event is described, repeating every xx days.

The fifth field describes the relationship of this event with the operation of the transmitter.

When **n=0**, the event will execute only if **PCRC/2™** is not repeating.
If **n=1** the event will execute only if **PCRC/2™** is repeating.
If **n=2** the event will execute whether repeating or not.

Automated configuration change overs should probably be programmed to execute regardless. Periodic announcements of club events probably should not interrupt normal repeater conversations. This field supports flexibility for all occasions.

The sixth field contains the **PCRC/2™** command to be executed. Multiple commands may be strung together using ## as a command separator.

Example: 281*000000*115*0*1030

will id the repeater (1030) every 15 minutes starting today at midnight only if the repeater is not repeating audio.

281*000000*115*2*1030##1100

will id the repeater (1030) and issue the time (1100) every 15 minutes starting today at midnight whether repeating or not.

281*12011991*180030*307*0*29015*15*ABC

will initiate morse code practice (290) on Sundays (12-01-1991 was a Sunday) at 30 seconds past 6:00PM only if no one is talking on the repeater (repeater is not repeating).

282n DELETE TIMED EVENT

Use this command to delete an event that is pending that you do not want to execute. **PCRC/2™** will issue a 5 second tone prompt. Key up during the tone prompt and enter 0 to delete the event.

The entry in the SWEVENTS.DAT file is not actually erased, it is just replaced with a software event that has long since expired.

```
01-10-1800-12:12:12,0,0,1100
```

283 ANNOUNCE NUMBER ACTIVE EVENTS/TIME AND DATE OF NEXT EVENT

Use this command to discover how many timed events are selected and the time and date of the next event.

MORSE CODE PRACTICE

Three types of morse code practice sessions are supported by **PCRC/2™**. Each session type can be programmed for both code speed and space speed. For example, programmable space speeds can be used to listen to characters sent at a 13 words per minute, and spaced out at an overall rate of 5 words per minute.

A voice announcement can precede and follow each session. This provides an automatic read back of the morse text sent. The text content can originate from an uploaded ascii file, an uploaded ascii word file, or random characters generated by **PCRC/2™**.

Code practice can be terminated by keying up on the main receive frequency and entering 0.

290c*s*f CODE PRACTICE FROM ASCII FILE

The three parameters are code speed (**c**), and space speed (**s**) in words per minute, and filename.COD (**f**).

Example: 29021*13*A123 initiates a practice at 21 words per minute, with 13 words per minute spacing between characters, from the DOS text file 1.COD shown below.

The key words VOICE, CODE, and SPELL are used to direct the activity of the practice. The voice file WELCOM5.SPC is an introduction for the 5 word per minute session that is about to begin. The words that follow CODE will be sent as dits and dahs and then SPELLed out.

```
VOICE WELCOM5.SPC
CODE EISTMO EIEM STEMO OMSTI
SPELL EISTMO EIEM STEMO OMSTI
VOICE THANK5.SPC
```

291c*s*t*i RANDOM CHARACTER CODE PRACTICE

PCRC/2™ will generate random characters at the selected code speed **(c)** and space speed **(s)** for a period of time **(t)** with a readback at an interval **(i)** specified in minutes.

Example: 29121*21*5*1 initiates a 5 minute random character practice session at 21 words per minute with 21 words per minute spacing between the characters and a voice readback at one minute intervals.

292c*s*t*i RANDOM WORD CODE PRACTICE

Basically the same structure as the random character practice but random words selected from the WORDS.COD file.

THIS
IS
A
TEST
OF
THE
RANDOM
WORD
CODE

The words are spelled out at the specified interval **i**.

293c*s*string MORSE OUT string

The string will be interpreted as in the 135 command, and issued as morse code at the code speed and space speed selected.

Example: 29320*20*71 23 73 23 will code out "PCRC" at 20 words per minute with 20 words per minute spacing.

REMOTE BASE

PCRC/2™ supports up to two Doug Hall Electronics Remote Base Interfaces (RBI-1) using the Generic format. The RBI-1 can be used to control the Kenwood TM-x21, TM-x31, TM-x41 and TM-701 mobile radios.

PCRC/2™ commands are converted into a serial data stream which is transmitted to the RBI-1. A combination of signals from the AUX1 and LPT1 port are used to interface **PCRC/2™** to J2 on the RBI-1. The RBI-1 interfaces to the Kenwood radios through their microphone jacks.

The 3511*100*2*1 command prepares AUX1 for the proper remote base operating mode.

PCRC/2™ support of the generic format allows the user to make use of all the functions currently supported by the RBI-1:

- 8 user controlled outputs
- full frequency control, 4 ports/radios, and 4 bands
- transmitter power HI/MED/LOW
- CTCSS frequency select, encode on/off, decode on/off
- -20 and -12 Mhz offsets on 1200

In the future the RBI-1 is expected to support memories, squelch adjustment, and audio levels. Remote control of the audio level is already supported by the digital pots used in **PCRC/2™**.

More information on the RBI-1 and Generic format can be obtained from:

Doug Hall Electronics
815 E. Hudson St.
Columbus OH 43211
(614) 261-8871
FAX 261-8805

3000/3001n RESET/SET BIT n ON RBI-1

Resets/sets the desired bit (n = 0-7) of the 8 bit user function port (J7) on the RBI-1 interface.

300*b OUTPUT BYTE b ON RBI-1

The decimal value **b** (0-255) will be presented on the 8 bit user function port (J7) of the RBI-1 interface.

301n SELECT BAND n

Activates the appropriate band on the RBI-1.

n=0 1240, n=1 1250, n=2 140, n=3 220, n=4 440
n=5 1270, n=6 1280, n=7 1290, n=8 1260, n=9 (future)

302n SELECT OUTPUT POWER n

Sets the output power desired for the selected band. Low, medium, and high power can be selected.

n=0 low, n=1, high, n=2 med

3030/3031 DISABLE/ENABLE REMOTE RECEIVE
3040/3041 DISABLE/ENABLE REMOTE TRANSMIT

Disables or enables the receiver/transmitter of the selected band.

305n SELECT TRANSMITTER SHIFT

Sets the transmitter shift for the selected band. Valid offsets are minus, plus, simplex, and minus 20 (for the 1200 band only).

n=0 minus, n=1 plus, n=2 simplex, n=3 minus 20

306n..n SELECT FREQUENCY n..n

Sets the frequency of the selected band. The decimal point is excluded from the parameter string. Additionally, the parameter string does not include the frequency prefix.

ie 3068475 is used to select 448.475

3070/3071 POWER OFF/ON SELECTED RADIO

Turn off/on power to the selected band.

3080n SELECT CTCSS

Select one of the 38 CTCSS tones (n = 1-38).

30810/30811 DISABLE/ENABLE CTCSS ENCODE
30820/30821 DISABLE/ENABLE CTCSS DECODE

Disable/enable the CTCSS encode/decode for the selected band.

3090 RESET RBI-1, INITIALIZE RADIO

Instructs PCRC/2™ to reset the RBI-1 interface and initialize the active radio.

3091 RESET RBI W/O INITIALIZATION

Instructs PCRC/2™ to reset the RBI-1 interface without changing the radio settings.

3092/3093 START/END RBI-1 BATCH COMMANDS

The START/END batch structure allows **PCRC/2™** to build a single command string for transmission to the RBI-1. This significantly improves the RBI-1 response time compared to multiple individual commands.

In the following example **PCRC/2™** instructs the RBI-1 to select the 2m band, set frequency to 144.640, and CTCSS encode 4Z, using multiple command strings.

3012	Select 2m	
		PCRC/2™ transmits to RBI-1
3064640	Select 144.640	
		PCRC/2™ transmits to RBI-1
308021	Select 136.5 (4Z)	
		PCRC/2™ transmits to RBI-1
30811	CTCSS Encode	
		PCRC/2™ transmits to RBI-1

In the next example **PCRC/2™** instructs the RBI-1 to select the 2m band, set frequency to 144.640, and CTCSS encode 4Z with a single command string.

3092	Begin Batch Sequence	
3012	Select 2m	
3064640	Select 144.640	
308021	Select 136.5 (4Z)	
30811	CTCSS Encode	
3093	End Batch Sequence	
		PCRC/2™ transmits to RBI-1

3094[n] SELECT RBI-1 REMOTE BASE n (1/2) REMBASEnPNUM

When issued without a parameter, **PCRC/2™** will announce which of the possible two RBI-1 controllers is selected. The selected controller will receive any subsequent remote base commands.

OUTPORT/INPORT COMMANDS

PCRC/2™ supports the PC-LAB card model PCL-711S which contains two 8 bit digital I/O ports, one 12 bit resolution analog output (0-10v), and eight 12 bit resolution analog inputs (-5v-+5v). The half card can reside in any 8 bit PC\XT\AT expansion slot.

The PCL-711S is available through **JDR MICRODEVICES, ADVANCED COMPUTER PRODUCTS** and many other companies offering data acquisition products for PC compatibles. More information is available from:

JDR MICRODEVICES
2233 Samaritan Drive
San Jose CA 95124
(800) 538-5000 (408) 559-1200
FAX 559-0250

Advanced Computer Products
1310 E Edinger
Santa Clara CA 92705
(800) FONE ACP (714) 558-8813
FAX 558-1603

DIGITAL I/O

The digital I/O commands can be used to control up to eight 8 bit ports. These ports can reside on the PCL-711 or they may be on a parallel printer card in the PC.

The DOS text file PPORTS.DAT contains the definitions and hardware addresses for the digital input or output ports. Hardware addresses are expressed in decimal. Ports and bits are numbered 1-8. An example of the PPORTS.DAT file follows:

```
OADDRESS,1,888
INIT,1,255
IADDRESS,1,889

IADDRESS,2,550
IADDRESS,3,551
OADDRESS,2,557
OADDRESS,3,558
```

The standard address for LPT1:, 888 (378H) is assigned to output port number 1 and will be initialized to 255 (FFH). The input portion of LPT1:, 889 (379H) is also defined.

The PCL-711 card has two digital ports that can be defined at 550 (226H), and 551 (227H). The corresponding output addresses can be found at 557 and 558.

310p*b RESET BIT b ON PORT p
311p*b SET BIT b ON PORT p

The indicated bit will be reset/set for the indicated port.

312p*b TOGGLE BIT b ON PORT p

The state of the indicated bit will be toggled from reset-to-set or set-to-reset depending on it's value before the command was issued.

313p*byte WRITE BYTE TO PORT p

The indicated port will be written with the supplied value.

Example: `3131*12` A decimal 12 (00001100) will be written to port 1.

314p*mask WRITE MASK TO PORT p

The indicated port will be written with the supplied values. The `*` in the mask field indicates that a bit value should not be changed.

Example: `3141*111100**` The high nibble will be written with 1's, the two high bits of the low nibble will be written with 0's, and the two low bits of the low nibble will remain unchanged on port 1.

This command can be used to write the binary equivalent of the example in command 313 above:

`3141*00001100` A decimal 12 will be written to port 1

315p*mask TOGGLE BITS ON PORT p

The indicated bits will be toggled on the specified port. The `*` in the mask field indicates that a bit value should not be changed.

Example: `3151*1111****` The high nibble bits will be toggled. The low nibble will remain unchanged.

INPORT COMMANDS

320p ANNOUNCE PORT VALUE

The decimal value of the eight bit port (**p**) will be announced.

321p*b ANNOUNCE BIT STATUS

The status ACTIVE or INACTIVE will be announce for the indicated port (**p**) and bit (**b**).

COMPARE DIGITAL VALUE

These commands enable you to execute a **PCRC/2™** command string based upon the value of a digital input port. The value of the port (**p**) is read to determine if it is active (1) or inactive (0). If the comparison is true, the **PCRC/2™** command string is executed.

322p*b*command IF INACTIVE THEN COMMAND

If the status of the specified port (**p**) and bit (**b**) is INACTIVE the **PCRC/2™** command string will be executed.

323p*b*command IF ACTIVE THEN COMMAND

If the status of the specified port (**p**) and bit (**b**) is ACTIVE the **PCRC/2™** command string will be executed.

Example: 3231*3*1030##1100 If port 1 bit 3 is active the repeater will id and say the time.

ANALOG I/O

The analog inputs provided on the optional PCL-711 board are very handy for monitoring power supply voltages, frequency deviation, S meter, and power amplifiers. The digital voice output capabilities of **PCRC/2™** allow you to specify any unit of measure required to represent an analog voltage as a meter reading.

The PC Lab documentation describes the set up required for operation. The following examples assume that the 5 volt setting has been selected on the PCL-711 card.

330v*l*h SET ANALOG OUTPUT

This command specifies the value (**v**) that the analog output based on the low (**l**) and high (**h**) scale provided. The default scale value is 0-4096.

Examples:	33050*0*100	set the analog output to the mid point.
	3301024	set to 25% of the 0-4096 default scale.
	3302D88*0*5	set to 2.88 volts on a 0 to 5 volt scale.

331p ANNOUNCE VALUE OF ANALOG PORT p

PCRC/2™ will read the specified port (**p** = 1-8) and announce the value as a number between -2048 and +2048.

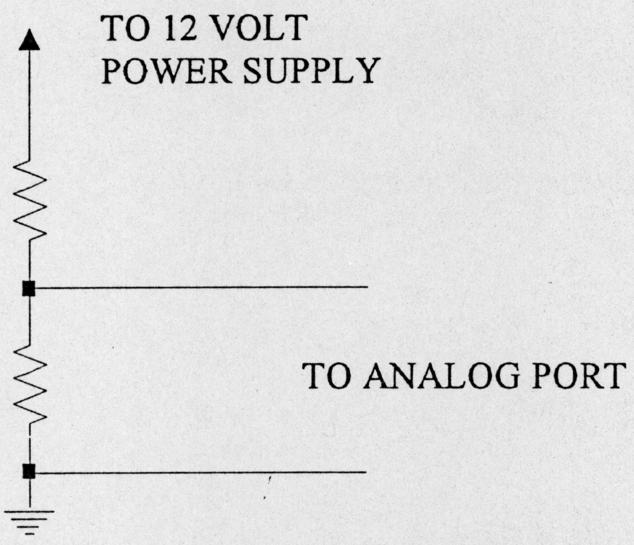
332p ANNOUNCE SCALED VALUE OF PORT p

The value of the analog port (**p**) will be announced according to the scale information contained in the ANALOG.DAT file. The file contains entries that equate the actual analog voltage readings with a meter scale. The following entry for port 6 equates an input reading of 0-5v with the range of a 12v power supply.

Example of entry in ANALOG.DAT: 6,0,5,0,12 where:

6 = port number (1-8)
0 = actual analog low voltage reading (-5v - +5v)
5 = actual analog high voltage reading (-5v - +5v)
0 = scale value correlated to actual analog low reading
12 = scale value correlated to actual analog high reading

The accompanying voltage divider circuit would be used to properly interface port 6 to the 12 volt power supply.



The 201/202 **PCRC/2™** voice record and play commands can be used to create meaningful phrases for meter readings. If voice file 100 contains the phrase "the power supply measures", and voice file 101 contains the phrase "volts", then the following **PCRC/2™** command string could be used to generate "the power supply measures 11 volts".

Example: `202100#3326#202101`

COMPARE ANALOG READING

These commands enable you to execute a **PCRC/2™** command string based upon the value of an analog input port. The value of the port (**p**) is compared to the low (**l**) value, the high (**h**) value, or the range. If the comparison is true, the **PCRC/2™** command string is executed.

The low (**l**) and high (**h**) values referenced in the following commands refer to the scaled readings as defined in the ANALOG.DAT file.

The letter `D` represents the decimal point when representing precision high and low values.

Example: `12D5` for 12.5

333p*l*command If p < l THEN COMMAND

The command string will be executed if the value of the analog port (**p**) is less than the value supplied (**l**).

Using our power supply example from above, we can ANNOUNCE (202) our "low voltage" PHRASE (102) based upon the following command if the power supply drops below 11.5 volts: 3346*11D5*202102

Automatically scheduling this reading to happen using the SET TIMED EVENT (281) command, **PCRC/2**™ can continuously monitor for and report low power supply voltage conditions.

334p*l*h*command IF p >= l and p <= h THEN COMMAND

The command string will be executed if the value of the port (**p**) is between or equal to the low (**l**) and high (**h**) values supplied.

Example: 3341*5*10*103 If the voltage on port 1 is between 5 and 10 volts then **PCRC/2**™ will execute command 103

335p*h*command IF p > h THEN COMMAND

The command string will be executed if the value of the analog port (**p**) is greater than the value supplied (**h**).

Example: 3351*10*103 If the voltage on port 1 is greater than 10 volts **PCRC/2**™ will execute command 103.

LINKS AND AUXILIARY I/O

The AUX1 and AUX2 ports can be used to interface to a variety of audio or radio devices. The ports can be used with and without control line signaling (COS, PTT).

There are seven modes of operation defined for the auxiliary inputs and outputs. Additionally, the control of independently operating backbone links using both AUX1 and AUX2 can be combined with mode 7. The special LINKATCH line can be used to link in the local repeater from the AUX inputs.

3400/3401 DISABLE/ENABLE BACKBONE LINK

BBNATTIME, BBNATMASK

In the backbone link mode, one transceiver is attached to AUX1 and a second is attached to AUX2. The audio and control signals are crossed and controlled by **PCRC/2™**. The backbone will operate independently of the main repeater.

These commands only apply to repeaters that are in the middle of a backbone. Repeaters that are at the ends of a backbone configuration require only one transceiver. See APPENDIX A for a diagram of a typical backbone link configuration.

3410/3411 DISCONNECT/CONNECT REPEATER TO BACKBONE

The main repeater will be connected or removed from the backbone link when this command is issued from the main repeater.

Since touch tones are passed through to the backbone to control telemetry down the link, the disconnect command needs to be framed with ### for **PCRC/2™** to recognize it as a command that should be acted on locally.

Example: ###3410### Disconnect repeater from the backbone link.

LINKATCH

The same LINKATCH hardware line is present on both the AUX1 and AUX2 connector. It can be used to disconnect and connect the main repeater from a backbone link from the backbone itself. **PCRC/2™** monitors this line for transitions, and will execute RB0_30.RBT on a high to low transition, and execute RB0_31.RBT on a low to high transition.

NOTE: the state of the line (low or high) does not indicate the status of the main repeater connection. To assure that **PCRC/2™** will see a transition, it is necessary to perform three writes to the LINKATCH line to negate the last 3410/3411 command issued from the repeater side.

This means that driving the line **low-high-low** will execute RB0_30.RBT and driving the line **high-low-high** will execute RB0_31.RBT.

To connect the repeater from the link side, you need to provide signaling that will drive the LINKATCH bit. Frequently this is done with tone page decoders or DTMF decoders (Communications Specialists PE-2P, DTD-1). Putting the 3410 command in RB0_30.RBT and the 3411 command into RB0_31.RBT will instruct **PCRC/2™** to disengage or engage the repeater based on the transitions of LINKATCH.

35n[r][*m a1 a2*p*t] AUXn MODE DEFINITION

This command defines the relationships of the audio paths and control lines for the auxiliary ports AUX1 and AUX2.

The shortest form of the command is used to tell **PCRC/2™** to ignore audio and control lines on port **n**.

351	turn off auxiliary 1
352	turn off auxiliary 2

The remaining parameters determine whether there is a **r**eceiver attached, how COS on the **m**ain, **a**ux**1**, and **a**ux**2** ports effects transmitters on this port, which **P**TT mode will be used, and whether **t**ouch tones will be passed through the link.

when **r** = 0 no receiver is attached,
when **r** = 1 a receiver is attached.

A 1/0 bit mask is used to indicate whether the COS signal from the main, aux1, or aux2, will trigger the transmitter on this port.

010	the aux1 COS will trigger PTT on the selected port **n**

The three types of transmit modes are:

p = 1 the aux PTT signal will follow the main transmitter PTT.
p = 2 the aux PTT signal will follow the COS signal described in the COS mask. When COS drops, PTT stops; no hangtime.
p = 3 the aux PTT signal will be active when the main transmitter PTT is active but drops when COS drops. In other words, the aux PTT is inactive during the main transmitter hangtime. This is HT mode.

Touch tones may be ignored by **PCRC/2™** or they may be acted upon.

t = 0 all touch tones presented on the main receiver are acted upon.
t = 1 touch tones presented on the main receiver are ignored but passed through the link.

Some examples of commands that emulate the older 35n/36n constructs of earlier **PCRC/2™** software follow. The newer command format is easier to use and much more flexible.

Old Mode	Command	Description
0	351	turn off auxiliary 1, ignore COS, do not assert PTT, disconnect aux1 audios from main system audio.
1	3511	enable aux port 1 as a receiver. Some uses for this option are monitor receivers, microphones to listen to the repeater site, or audio sources such as tape players. If a device which lacks an active COS signal is used, the main transmitter will remain keyed until the NATIMER for the main transmitter times out or the ###351### command is issued.
2	3510*100*1*0	audio from the main repeater is passed to aux 1, which has no receiver, PTT will follow the main PTT and DTMF tones are acted upon.
3	3511*100*1*0	same as above but there is a receiver
4	3511	enable aux port 1 as a receiver.
5	3510*100*1*0	same as 2.
6	3511*110*1*0	audio from the main repeater is passed to aux 1, aux 1 audio will be mixed with the main repeater audio, PTT will follow the main PTT which is activated by COS from the main or aux1, and DTMF tones are acted upon.
7	3511*100*2*1	audio from the main repeater is passed to aux 1, aux 1 audio will be mixed with the main repeater audio, PTT will follow COS described by the COS bit mask, and DTMF tones are passed to the remote base and not acted upon.
8	3511*100*3*0	audio from the main repeater is passed to aux 1, aux 1 audio will be mixed with the main repeater audio, PTT will be active only when the repeater is 'talking' or when the main COS is active. follow COS described by the COS bit mask, and DTMF tones are acted upon.

INACTIVITY TIMERS

MAXNATIMERS

PCRC/2™ commands can be issued automatically after a period of no activity. Activity is defined as an active COS signal from the main or aux receivers or execution of a command. Some commands such as 290 (morse practice) can be active for a period of several minutes without any interaction with the receiver.

These timers can be specified to do housekeeping chores like turning off the links and change tail messages based upon criteria you choose. The number of timers you will use must be initialized in the REPEATER.CFG file.

370N CLEAR NO ACTIVITY TIMER N

This command is used to discontinue operation of the specified no activity timer.

371n*t*ar*m*a1*a2*cf*command SET NA TIMER

Set the specified timer **n**, to count down **t** seconds. If this is a one time only timer **ar** is set to 0, if it is to repeat this function **ar** is set to 1. The no activity condition will be monitored on the main and aux receivers if **m**, **a1**, or **a2** is set to 1. If the execution of commands is to be considered, **cf** is set to 1.

The following example would disable AUX1 whenever there is no activity on the main receiver for 5 minutes:

```
3712*300*1*1*0*0*1*350
```

To implement a tail message that says 'good bye' after 45 seconds of no activity on the main receiver and no commands executing:

201BC	create the 'good bye' voice file RRECBC.SPC
3713*45*1*1*0*0*1*202BC	set NA timer 3 to repeatedly count down 45 seconds of inactivity

INFRA RED REMOTE CONTROL

The optional Home Control Concepts HCC-PCIR, coupled with Universal Electronics' One-For-All 12™ allows **PCRC/2™** to "push buttons" on infra red remote controls of televisions, vcr's, cable boxes, satellite receivers, CD players, and stereo's.

The HCC-PCIR remote controller can be interfaced to **PCRC/2™** via the COM1 or COM2 serial port. The One-For-All 12 ™ IR remote replaces up to 12 existing IR remotes and can also interface to X-10 devices when coupled with the HCC-3000.

More information is available from:

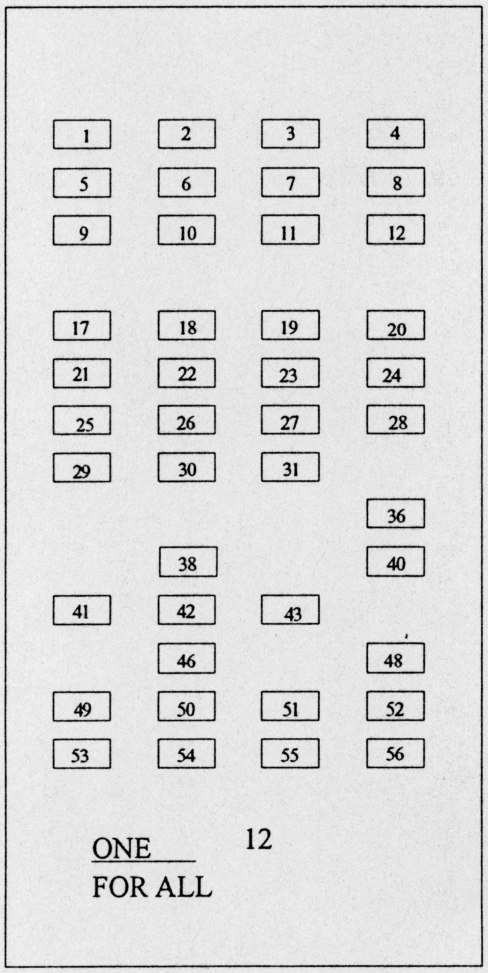
Home Control Concepts
9520 Padgett Street
Suite 108
San Diego CA 92126
619-693-8887
FAX 693-8892

380n PUSH IR BUTTON n

This command issues the equivalent infra red remote command accomplished by pressing button **n** on the One-For-All 12 ™ remote control. The buttons are numbered according to the following diagram.

Several buttons may be pressed in succession when separated by *.

For example:	3805	issues IR command for button 5
	3805*17*19	issues IR commands for buttons 5, 17, and 19


1
2
3
4
5
6
7
8
9
10
11
12
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
36
38
40
41
42
43
46
48
49
50
51
52
53
54
55
56
ONE
FOR ALL
12

EMERGENCY CALL

*911 EMERGENCY

ENAB911

When this command is invoked, **PCRC/2™** executes the RB0_EMR.RBT batch file. Typically, instructions for placing a phone call for emergency services of police, fire, or rescue are given by instructing **PCRC/2™** to announce repeater phrase 14.

The command is terminated by any touch tone digit.

If the command is enabled in the REPEATER.CFG file, anyone can access the emergency services with the *911 command. If it is disabled in the configuration file then *911 can only be accessed by a logged on user whether or not they have autopatch privileges.

If the RB0_EMR.RBT file causes the autopatch command to be executed, the SMDR.DAT file will log the activity.

USER LOGON

99n LOGON USER n

Users identify themselves to **PCRC/2™** by logging on with a unique security code issued to them by the Sysop. Logging on raises the security level of the repeater and affords the user the full complement of features available to him that are not available to guest users.

Once a user is logged on, **PCRC/2™** can determine if there are any voice mail messages waiting. The user number is also an integral part of other **PCRC/2™** features such as personalized macro commands, and function keys.

Each user can define a batch file that will be executed after logging on. The DOS file RBu_2.RBT is reserved for this purpose. If after logging on a personalized batch file does not exist, **PCRC/2™** will execute the generic logon batch file for USER0.

The system batch file RB0_42.RBT is executed prior to the user controlled RBu_2.RBT batch file. This is a handy place to put commands that should be executed whenever anyone logs on.

99999 LOGOFF (Logon USER0)

This command logs off the current user and logs on the guest user, USER0. The DOS file RBu_3.RBT is executed when logging off, and can contain appropriate **PCRC/2™** commands.

The system batch file RB0_43.RBT is executed after the user controlled RBu_3.RBT batch file. Commands that need to be executed whenever anyone logs off should be placed in this file.

Users are automatically logged off when the transmitter has not been keyed for a period of time which is programmable by the Sysop.

Section III

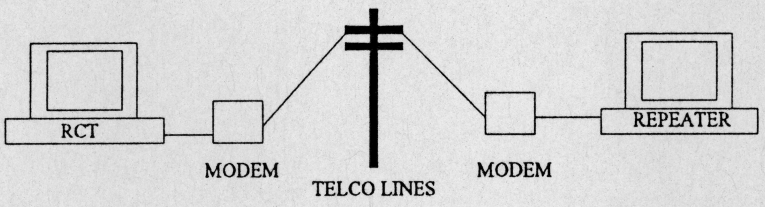
Remote Access

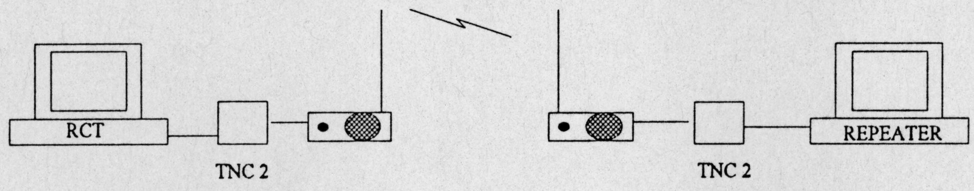
PCRC/2™ supports Hayes compatible modems and TNC-2 packet TNCs as remote communications devices through the pc serial ports COM1 or COM2. A **PCRC/2™** configuration can support only one remote communication device at a time. Selection is controlled by the variable MODEMFLAG in the REPEATER.CFG file.

Remote communication allows the control operator to perform many routine file maintenance tasks in the background leaving the repeater fully operational. A special MONITOR mode echoes the PC display screen activity to the remote communications terminal. This allows the control operator to key an eye on repeater operation. Commands can be entered from the remote location also.

A Remote Communications Terminal (RCT) can be a dumb terminal, but is most likely a PC running a terminal emulation program that supports file transfer such as BitCom, ProComm, or QModem.

The diagram below illustrates typical hardware setups:





Software Preparation For Hayes Compatible Modem

Both the RCT and **PCRC/2™** must be configured alike for communications. The RCT should be in CAPS LOCK. Be sure that the following variables are properly set in the REPEATER.CFG file:

```
COMPORT = COM1
BAUDRATE = 2400
MODEMFLAG = TRUE
```

To be sure that both modems are initialized properly issue the AT&F&W command string. Most communications failures can be traced to improper initialization of the modem.

Software Preparation For TNC 2 Compatible Packet

Both the RCT and **PCRC/2™** must be configured alike for communications. The RCT should be in CAPS LOCK. Be sure that the following variables are properly set in the REPEATER.CFG file:

```
COMPORT = COM1
BAUDRATE = 1200
MODEMFLAG = FALSE
PACKETID = KA2UGZ-1
```

PCRC/2™ performs the initialization of the TNC when the 1061 command is entered. The RESET command should be issued from the RCT to the remote TNC.

Making Contact

Logon to **PCRC/2™** and execute the 1061 command to enable remote communications. You must stay logged on until connection is made. After connection you may log off at any time.

Hit 'enter' on your RCT to see the following greeting and menu:

```
Welcome to the PCRC Modem Service

DNLOAD filename - Transfer a file from PCRC
UPLOAD filename - Transfer a file to PCRC
SHELL           - Load and Run COMMAND.COM
BYE             - Exit Modem Service and Hang up


COMMAND >
```

HELP or ? displays the initial command menu. BYE disconnects the RCT from **PCRC/2™**.

UPLOAD is used to transfer files from the RCT to **PCRC/2™** using the YMODEM BATCH protocol. The upload command is followed by the DOS path that **PCRC/2™** should use to store the file. The YMODEM protocol automatically transfers the file names. All commands must be in upper case. For example, to upload a new USER.SRC file to the UPLOADS directory,

```
COMMAND>  UPLOAD C:\REP\UPLOADS\
Send Data Now ....
```

At this prompt **PCRC/2™** is ready to accept files that it will place in the UPLOADS directory. The file transfer begins when the RCT transmits the selected filename(s) data; (programs such as QMODEM and ProComm initiate these transfers with the PGUP command).

When transferring large files transfer time can be reduced by using a compression scheme that creates .ZIP or .ARC files. Modem transfer times are relatively fast and secure compared to packet transfers which are slow and not secure. Compressing with encryption will secure sensitive files like USER.SRC or REPEATER.USR which contain user logon passwords.

The suggested sequence for sensitive file transfer over packet is:

encrypt (PKZIP) files,
establish contact with **PCRC/2™**,
UPLOAD to the UPLOADS directory,
SHELL into DOS,
decrypt via a pre-established batch file with the proper decryption password,
DOS copy the files to the proper locations,
EXIT shell which will reboot **PCRC/2™**.

DNLOAD transfers files from **PCRC/2™** to the RCT using XMODEM CRC as a protocol. The download command is followed by the DOS path and filename that **PCRC/2™** should transfer to the RCT. For example, to download the USER.SRC file,

```
COMMAND>  DNLOAD C:\REP\MAIN\USER.SRC
Receive Data Now ....
```

SHELL loads DOS by executing COMMAND.COM. Shell suspends operation of the **PCRC/2™** software which operates the repeater. The parameter that follows the command is a fail safe that will engage the **PCRC/2™** watch dog reset after counting down the specified seconds. When you EXIT from DOS, the pc reboots to reload the **PCRC/2™** software and resume repeater activity.

SHELL 600 will shell to DOS for a maximum of 10 minutes. Once COMMAND.COM executes, the operator may perform DOS tasks such as DIR, TYPE, COPY from the RCT as if they were at the repeater keyboard.

```
COMMAND > SHELL 600


Microsoft(R) MS-DOS(R) Version 5.00
             (C)Copyright Microsoft Corp 1981-1991.
```

```
C>DIR


 Volume in drive C is PCRCDEV C
 Volume Serial Number is 295E-18DD
 Directory of C:\REP\MAIN

.            <DIR>        11-29-92   5:33p
..           <DIR>        11-29-92   5:33p
REPEATER EXE     230000 10-15-92   7:18p
ALEVELS  DAT        265 10-15-92   7:58p
MORSE    DAT        314 11-24-91   5:20p
REPCONFI IDX       1478 10-10-92  12:59p
   .
   .
   .

VP600SE  EXE      13007 10-04-88   1:41p
PPORTS   DAT         62 03-10-92   7:31p
1        COD        100 10-10-92   1:54p
TEST     DAT       1664 03-01-93   8:13p
       30 file(s)      381880 bytes
                      4583424 bytes free

C>TYPE PPORTS.DAT
OADDRESS,1,888
INIT,1,255
IADDRESS,1,550
IADDRESS,2,551


C>EXIT

C>ctty con:
```

Upon exiting COMMAND.COM the repeater will reboot.

MONITOR (ON/OFF) allows the RCT to display the information that is displayed on the **PCRC/2™** screen. Once in this mode, the TT command can be used to enter touch tone commands directly from the RCT, and have them acted upon by **PCRC/2™**.

```
COMMAND>  MONITOR ON


COMMAND>  TT 1101
Sending the time ....
```

SYSOP CHECK LIST

Adding New Users:

☐ Increment MAXUSER in REPEATER.CFG
☐ Add user info to USER.SRC
☐ Run COMPUSER to create updated REPEATER.USR file
☐ Upload new REPEATER.CFG and REPEATER.USR files to repeater
☐ Copy WELCOM.RBT to RBn_2.RBT

PCRC/2™ BUG/SUGGESTION FORM

Instructions:

Make a photocopy of this form. Use this form to report problems or make suggestions for the **PCRC/2™** systems software, user manual or hardware system. Be sure to indicate revision numbers for software, hardware and user manual you are using. Mail or fax the completed form to:

PCRC Box 459 Bohemia NY 11716
FAX (516) 563-4716

Name ....Call ....

Address ....

Telephone ....Evening ....Fax ....

Check one:

☐ Hardware ☐ Software ☐ Manual ☐ Other

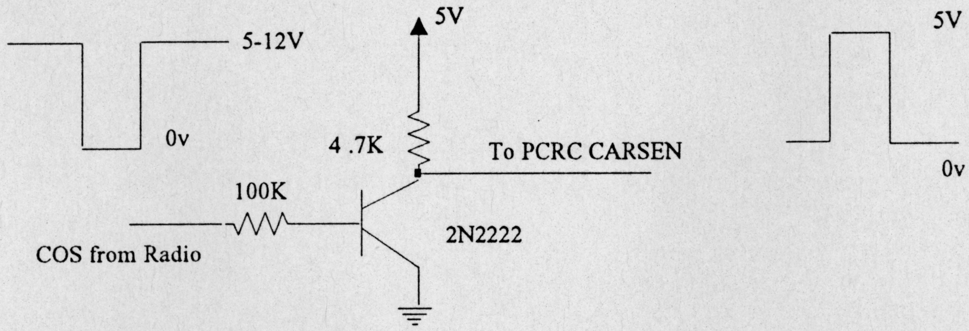
Description:

INTERFACE SIGNAL CONVERSION

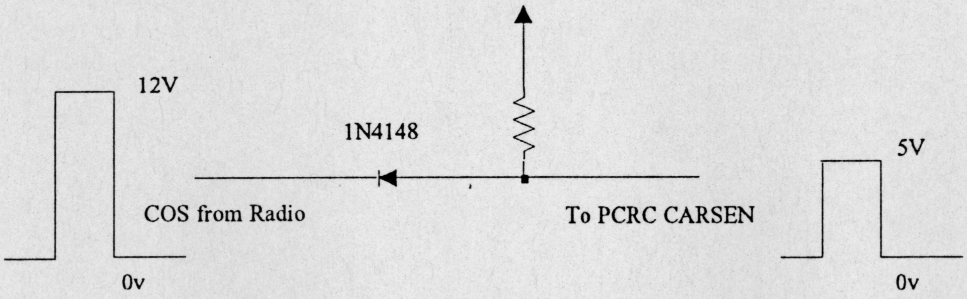
Some radios provide COS signals that are not directly compatible with **PCRC/2™**. When a compatible signal can not be extracted from another spot in the radio receiver, external signal conversion is required.

The suggested circuits are to be applied before the **PCRC/2™** interface connections. The user is responsible for the application and consequences of all system interfacing. Power for these circuits can be obtained from an un-used disk drive connector (+5, +12) or from pins 1/8/9/15 of a joystick port (+5).

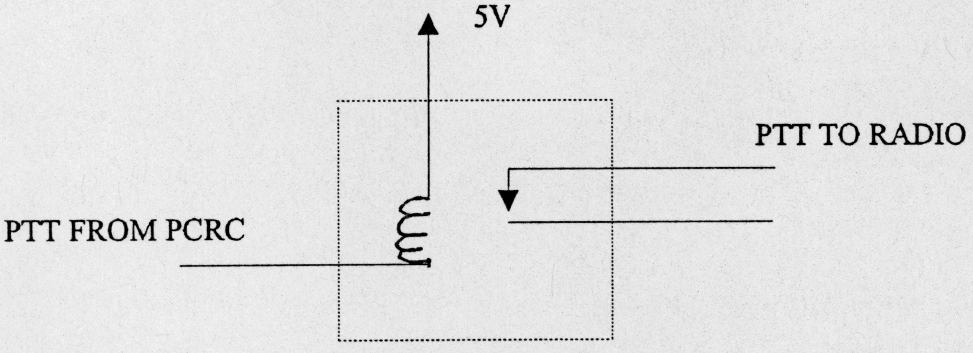
Some mobile radios have an active low COS that floats to the 12 volt rail:


5-12V
0v
5V
4.7K
To PCRC CARSEN
100K
COS from Radio
2N2222
5V
0v

Some radios have an active high COS that is > 5 VDC:

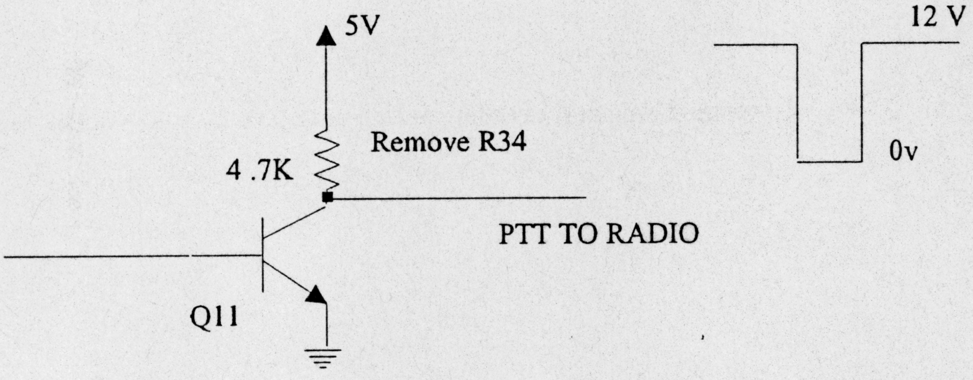

12V
1N4148
COS from Radio
0v
To PCRC CARSEN
5V
0v

Some radios may require an isolated PTT signal. **PCRC/2™** can be used to operate a 5 volt relay:


5V
PTT TO RADIO
PTT FROM PCRC

5 V RELAY

PCRC/2™ pulls the PTT signal to 5 volts through R34. It may be necessary to remove the pull up resistor to provide an open collector output for radios that pull up the PTT line to 5 or 12 volts.


5V
Remove R34
4 .7K
PTT TO RADIO
Q11
12 V
0v

FULLDUPLEX AUTOPATCHES

Fullduplex patches require that the caller and the repeater each have at least 1.5 transceivers. Usually the caller has a dual band radio, and the repeater has either a transmitter or receiver attached to one of the aux ports on the secondary band.

When the variable FDPATCH is set to AUX1 or AUX2, the usual cover tone is not issued and **PCRC/2™** will not mute the main transmitter audio. Additionally the patch audio will be attached to the appropriate AUX1 or AUX2 device if it has been enabled with the 351/352 command.

For example, the main repeater is set up on 440, and AUX2 has an auxiliary 2m transmitter. The user initiates the telephone call on the main 440 repeater and monitors the 2m frequency to hear both ends of the telephone conversation. It is not necessary to un key the main transmitter to hear the called party speak.

AUDIO DELAY USAGE

The optional **PCRC Digital Audio Delay** can be used to remove both DTMF and squelch tail bursts from the receive audio. The 4 wire hookup and 12 volt operation make installation simple.

The **PCRC/DAD** will provide 0, 128, 256, or 512 ms of delay via jumper selection or remote control. In the true digital tradition there is no complex balancing or tuneup required by older analog designs, and the built in band pass filter removes CTCSS from the received audio.

How It Works

At the heart of the **PCRC/DAD** is the Motorola MC145503 PCM codec/filter that performs the voice digitization and reconstruction as well as the band limiting and smoothing required for PCM systems.

A codec/filter is a device which is used for digitizing and reconstructing the human voice. These devices were developed primarily for the telephone network to facilitate voice switching and transmission.

The name codec is an acronym from "coder" for the A/D used to digitize voice, and "decoder" for the D/A used for reconstructing voice. A codec is a single device that does both the A/D and D/A conversions.

In a sampling environment, Nyquist theory says that to properly sample a continuous signal, it must be sampled at a frequency higher than twice the signal's highest frequency component. Voice contains spectral energy above 3 kHz, but its absence is not detrimental to intelligibility. To reduce the digital data rate, which is proportional to the sampling rate, a sample rate of 8 kHz was adopted, consistent with a bandwidth of 3 kHz.

Other Audio Delays

Audio delays such as the ACC and S-COM bucket brigade type have been successfully implemented with the **PCRC/2™** system. The S-COM ADM features a simple 4 wire hook up (+12, Ground, Audio In, Audio Out) and an on board 555 clock generator that the ACC unit lacks. The ACC unit will require an external clock.

Installation

The delay can be inserted in line with the main receiver audio (RECAIN). With the incoming audio delayed the squelch tail is effectively removed from the transmitted audio since **PCRC/2™** mutes the receive audio when COS drops.

If you want to eliminate both the squelch tail and the small DTMF burst that accompanies touch tones, one of the **PCRC/2™** aux ports can be dedicated as an audio processing loop. If this is the case, the AUDIODELAY variable is set to select AUX1 or AUX2 in the REPEATER.CFG file.

The audio delay is installed between AUXnAIN and AUXnAOUT. This way **PCRC/2™** can simultaneously route the incoming main receiver audio to the DTMF decoder and the audio delay. As soon as a touch tone is detected or COS drops, the main transmitter audio is muted.

TRANSMITTER AMPLIFIER DRIVE

When XMITAOUT will be interfaced to a high impedance input such as a microphone input, you may need to add a 1K resistor to the output of the transmitter audio amp U12A.

High impedance microphone inputs do not load down the amplifier enough to provide the drive of audio to the transmitter. The symptom is very low distorted transmitter audio.

Place a 1K resistor from U12-1 to ground (U12-5)

SOFTWARE UPGRADES

The general steps to follow when upgrading the system software are:

1) Replace the old with the new REPEATER.EXE and REPCONFI.IDX files.
2) Compare the new REPEATER.CFG with your old *.CFG files, adding any new variables to your *.CFG files. Generally new variables are found at the end of the REPEATER.CFG file.
3) Check the READ.ME file for any specific notes about the new release software.
4) Update the COMMANDSETs as required using the COMCLASS program.
5) Run COMPUSER to refresh the REPEATER.USR file after changes to the command sets.
6) Edit batch files which contain commands that have a new structure (ie a parameter has been added or removed).

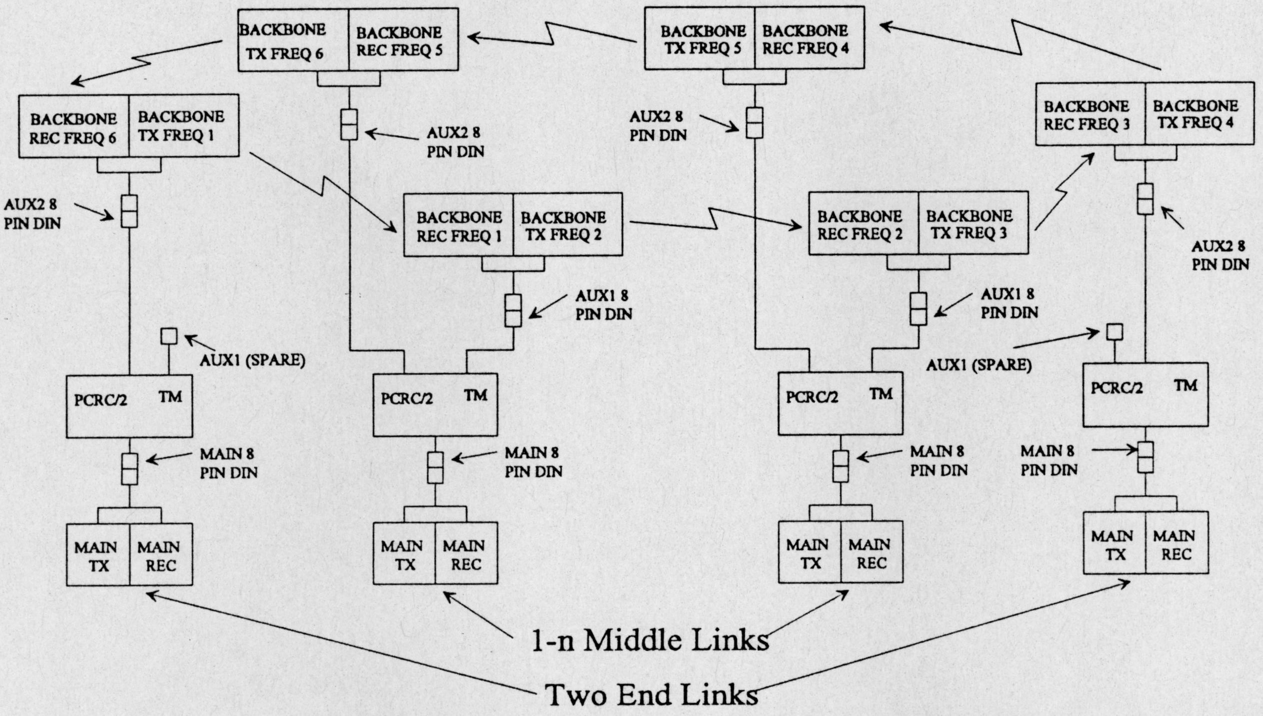
   Very often new releases will include new commands or revisions to the structure of existing commands. Check all files that may contain these commands: software events, hardware events, user 0 batch files,

   New commands should be added to the COMMANDSETs assigned to users as appropriate.

7) Check the edit history file which accompanies new releases for additional information on the enhancements and bugs that are addressed in the new software.

Section IV

APPENDIX A


BACKBONE TX FREQ 6
BACKBONE REC FREQ 5
BACKBONE TX FREQ 5
BACKBONE REC FREQ 4
BACKBONE REC FREQ 6
BACKBONE TX FREQ 1
BACKBONE REC FREQ 3
BACKBONE TX FREQ 4
BACKBONE REC FREQ 1
BACKBONE TX FREQ 2
BACKBONE REC FREQ 2
BACKBONE TX FREQ 3
AUX2 8 PIN DIN
AUX2 8 PIN DIN
AUX2 8 PIN DIN
AUX2 8 PIN DIN
AUX1 8 PIN DIN
AUX1 8 PIN DIN
AUX1 (SPARE)
AUX1 (SPARE)
PCRC/2 TM
PCRC/2 TM
PCRC/2 TM
PCRC/2 TM
MAIN 8 PIN DIN
MAIN 8 PIN DIN
MAIN 8 PIN DIN
MAIN 8 PIN DIN
MAIN TX
MAIN REC
MAIN TX
MAIN REC
MAIN TX
MAIN REC
MAIN TX
MAIN REC
1-n Middle Links
Two End Links

Backbone Link System Using PCRC/2™

APPENDIX B PAGER CODES

MOTOROLA TWO TONE SEQUENTIAL FREQUENCIES

GROUP 1		GROUP 2		GROUP 3		GROUP 4		GROUP 5		GROUP 6	
CODE	FRQ	CODE	FRQ	CODE	FRQ	CODE	FRQ	CODE	FRQ	CODE	FRQ
111	349.0	121	600.9	138	288.5	141	339.6	151	584.8	191	1153.4
112	368.5	122	634.5	108	296.5	142	358.6	152	617.4	192	1185.2
113	389.0	123	669.9	139	304.7	143	378.6	153	651.9	193	1217.8
114	410.8	124	707.3	109	313.0	144	399.8	154	688.3	194	1251.4
115	433.7	125	746.8	160	953.7	145	422.1	155	726.8	195	1285.8
116	457.9	126	788.5	130	979.9	146	445.7	156	767.4	196	1321.2
117	483.5	127	832.5	161	1006.9	147	470.5	157	810.2	197	1357.6
118	510.5	128	879.0	131	1034.7	148	496.8	158	855.5	198	1395.0
119	539.0	129	928.1	162	1063.2	149	524.6	159	903.2	199	1433.4
110	330.5	120	569.1	189	1092.4	140	321.7	150	553.9	190	1122.5

GE TYPE 99 TONE FREQUENCIES

TONE #	GRP 7 FREQ A	GRP 8 FREQ B	GRP 9 FREQ C
1	592.5	607.5	712.5
2	757.5	787.5	772.5
3	802.5	832.5	817.5
4	847.5	877.5	862.5
5	892.5	922.5	907.5
6	937.5	967.5	952.5
7	547.5	517.5	532.5
8	727.5	562.5	577.5
9	637.5	697.5	622.5
0	682.5	652.5	667.5

5/6 TONE SEQUENTIAL

TONE	FREQUENCY
0	600
1	741
2	882
3	1023
4	1164
5	1305
6	1446
7	1587
8	1728
9	1869
X	2010
R	459

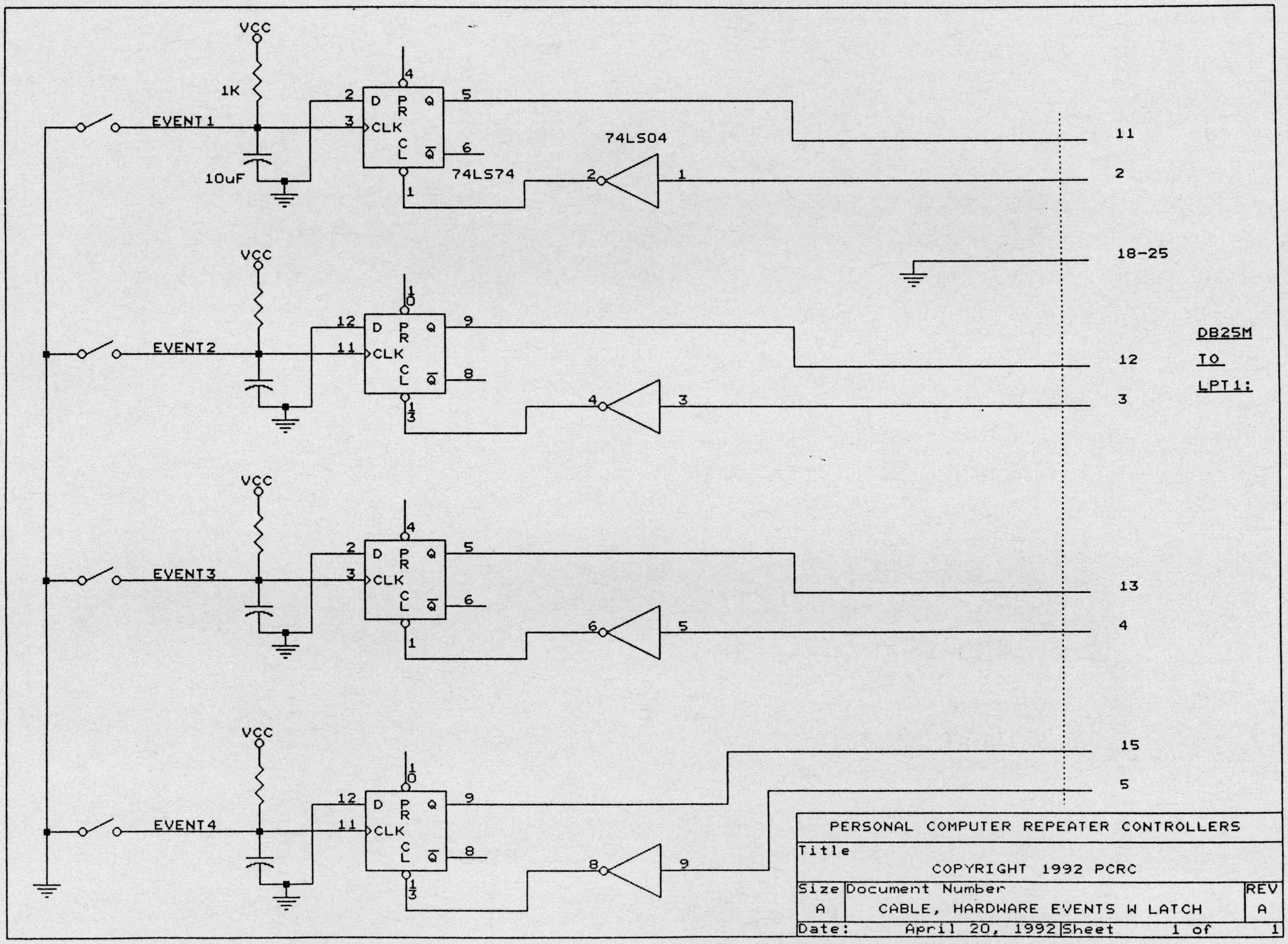
APPENDIX C
CTCSS TONES

GROUP A TONES USING COMM. SPEC. TS-32

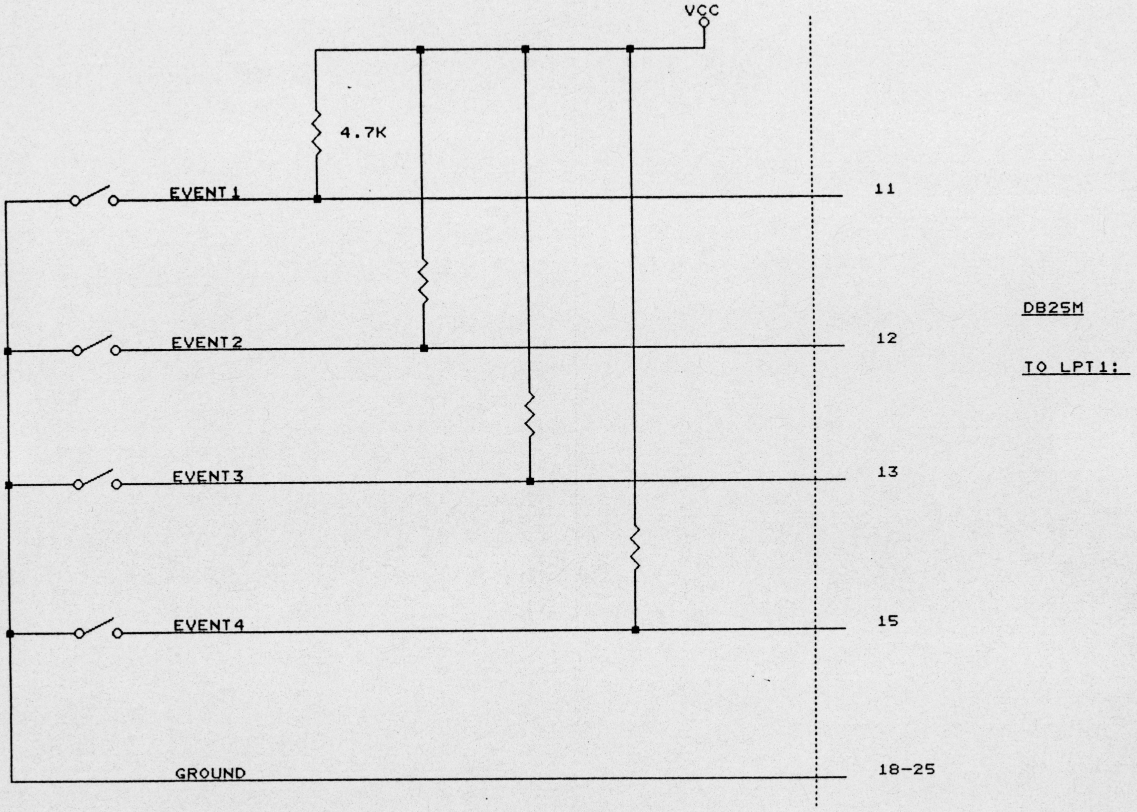
TONE #	FREQ	CODE	TONE #	FREQ	CODE
1	67.0	XZ	17	118.8	2B
2	71.9	XA	18	123.0	3Z
3	74.4	WA	19	127.3	3A
4	77.0	XB	20	131.8	3B
5	79.7	SP	21	136.5	4Z
6	82.5	YZ	22	141.3	4A
7	85.4	YA	23	146.2	4B
8	88.5	YB	24	151.4	5Z
9	91.5	ZZ	25	156.7	5A
10	94.8	ZA	26	162.2	5B
11	97.4	ZB	27	167.9	6Z
12	100.0	1Z	28	173.8	6A
13	103.5	1A	29	179.9	6B
14	107.2	1B	30	186.2	7Z
15	110.9	2Z	31	192.8	7A
16	114.8	2A	32	203.5	M1

APPENDIX D
LATCHED HARDWARE EVENTS

The following schematics illustrate how the parallel printer port can be used with hardware events or latched hardware events.


VCC
1K
EVENT1
10uF
2
3
D
PR
CLK
CL
Q
Q̄
4
5
6
1
74LS74
74LS04
2
1
11
2
18-25
VCC
EVENT2
12
11
10
9
8
13
4
3
12
3
DB25M
TO
LPT1:
VCC
EVENT3
2
3
4
5
6
1
6
5
13
4
VCC
EVENT4
12
11
10
9
8
13
8
9
15
5

PERSONAL COMPUTER REPEATER CONTROLLERS			
Title	COPYRIGHT 1992 PCRC		
Size	Document Number		REV
A	CABLE, HARDWARE EVENTS W LATCH		A
Date:	April 20, 1992	Sheet 1 of	1

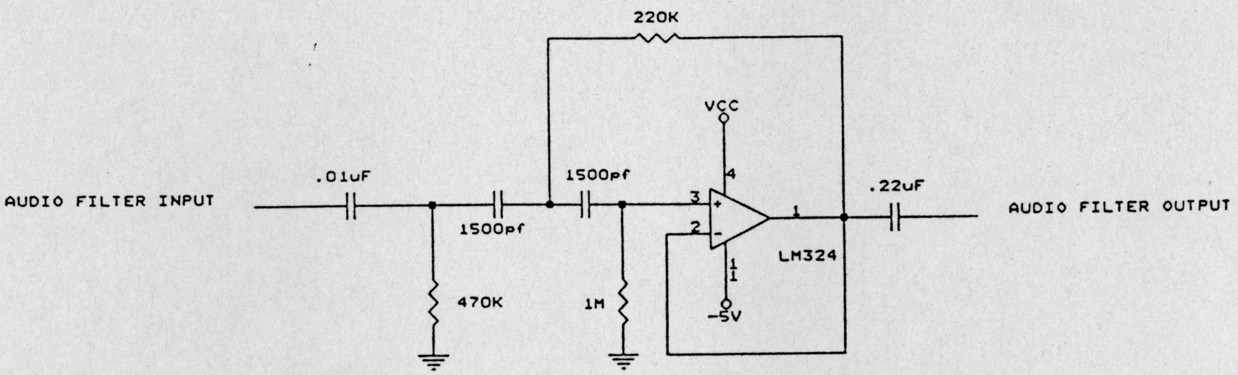

VCC
4.7K
EVENT1
EVENT2
EVENT3
EVENT4
GROUND
11
12
13
15
18-25
DB25M
TO LPT1:

PERSONAL COMPUTER REPEATER CONTROLLERS

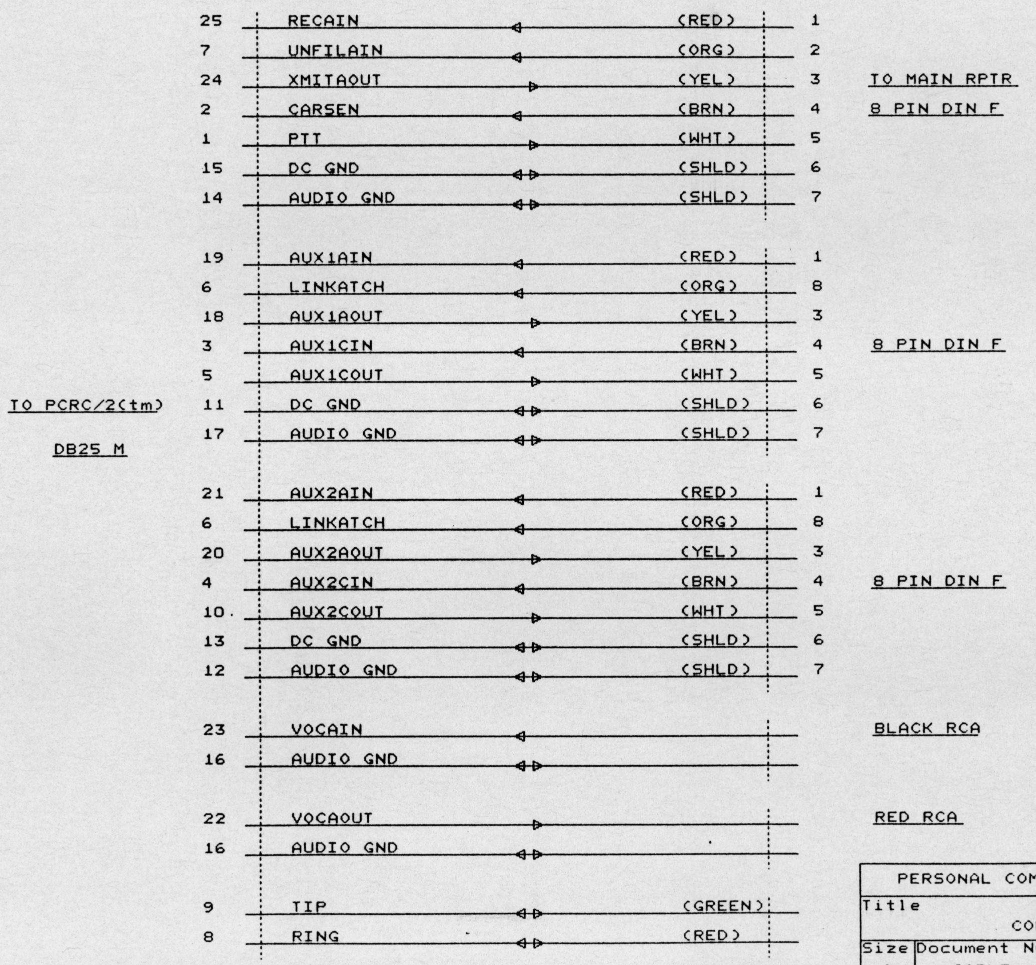
Title COPYRIGHT (C) 1992 PCRC		
Size A	Document Number CABLE HARDWARE EVENTS W/O LATCH	REV A
Date: April 20, 1992	Sheet 1	1

APPENDIX E
CTCSS FILTER

The following circuit can be used to filter CTCSS tones from receiver audio to provide filtered audio.


220K
VCC
AUDIO FILTER INPUT
.01uF
1500pf
1500pf
4
3
2
1
.22uF
AUDIO FILTER OUTPUT
LM324
11
470K
1M
-5V

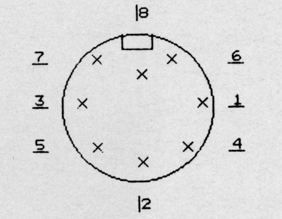
APPENDIX F



TO PCRC/2(tm)

DB25 M

25	RECAIN	◄	(RED)	1	TO MAIN RPTR 8 PIN DIN F
7	UNFILAIN	◄	(ORG)	2	
24	XMITAOUT	►	(YEL)	3	
2	CARSEN	◄	(BRN)	4	
1	PTT	►	(WHT)	5	
15	DC GND	◄►	(SHLD)	6	
14	AUDIO GND	◄►	(SHLD)	7	
19	AUX1AIN	◄	(RED)	1	8 PIN DIN F
6	LINKATCH	◄	(ORG)	8	
18	AUX1AOUT	►	(YEL)	3	
3	AUX1CIN	◄	(BRN)	4	
5	AUX1COUT	►	(WHT)	5	
11	DC GND	◄►	(SHLD)	6	
17	AUDIO GND	◄►	(SHLD)	7	
21	AUX2AIN	◄	(RED)	1	8 PIN DIN F
6	LINKATCH	◄	(ORG)	8	
20	AUX2AOUT	►	(YEL)	3	
4	AUX2CIN	◄	(BRN)	4	
10	AUX2COUT	►	(WHT)	5	
13	DC GND	◄►	(SHLD)	6	
12	AUDIO GND	◄►	(SHLD)	7	
23	VOCAIN	◄			BLACK RCA
16	AUDIO GND	◄►			
22	VOCAOUT	►			RED RCA
16	AUDIO GND	◄►			
9	TIP	◄►	(GREEN)		
8	RING	◄►	(RED)		



8 PIN DIN F

VIEW OF CONNECTOR FACE

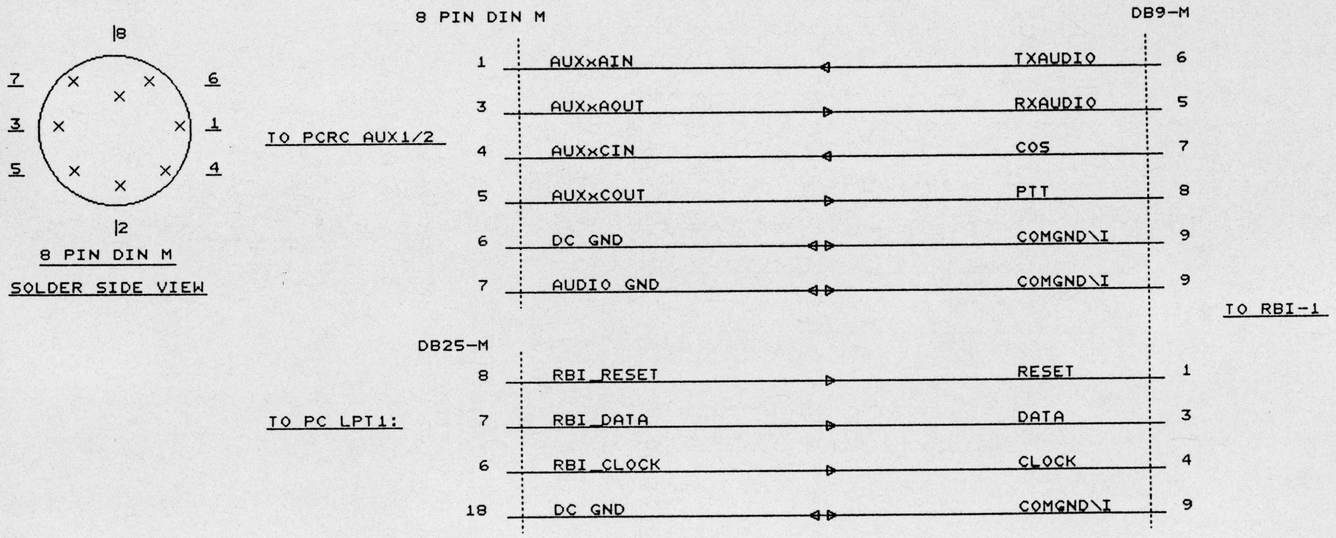
PERSONAL COMPUTER REPEATER CONTROLLERS

Title

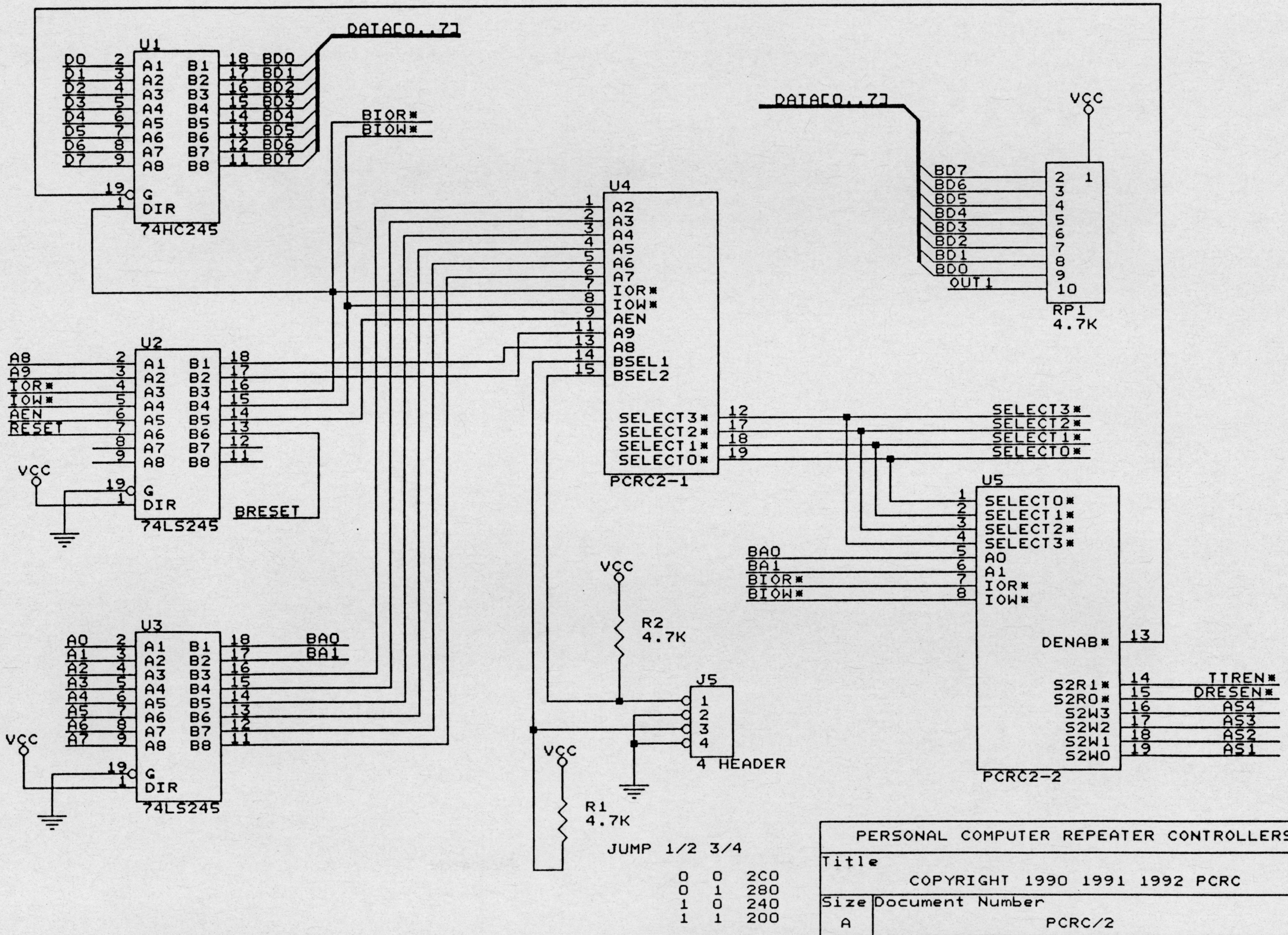
COPYRIGHT 1992 PCRC

Size	Document Number	REV
A	CABLE, INTERFACE TO PCRC/2(tm)	B

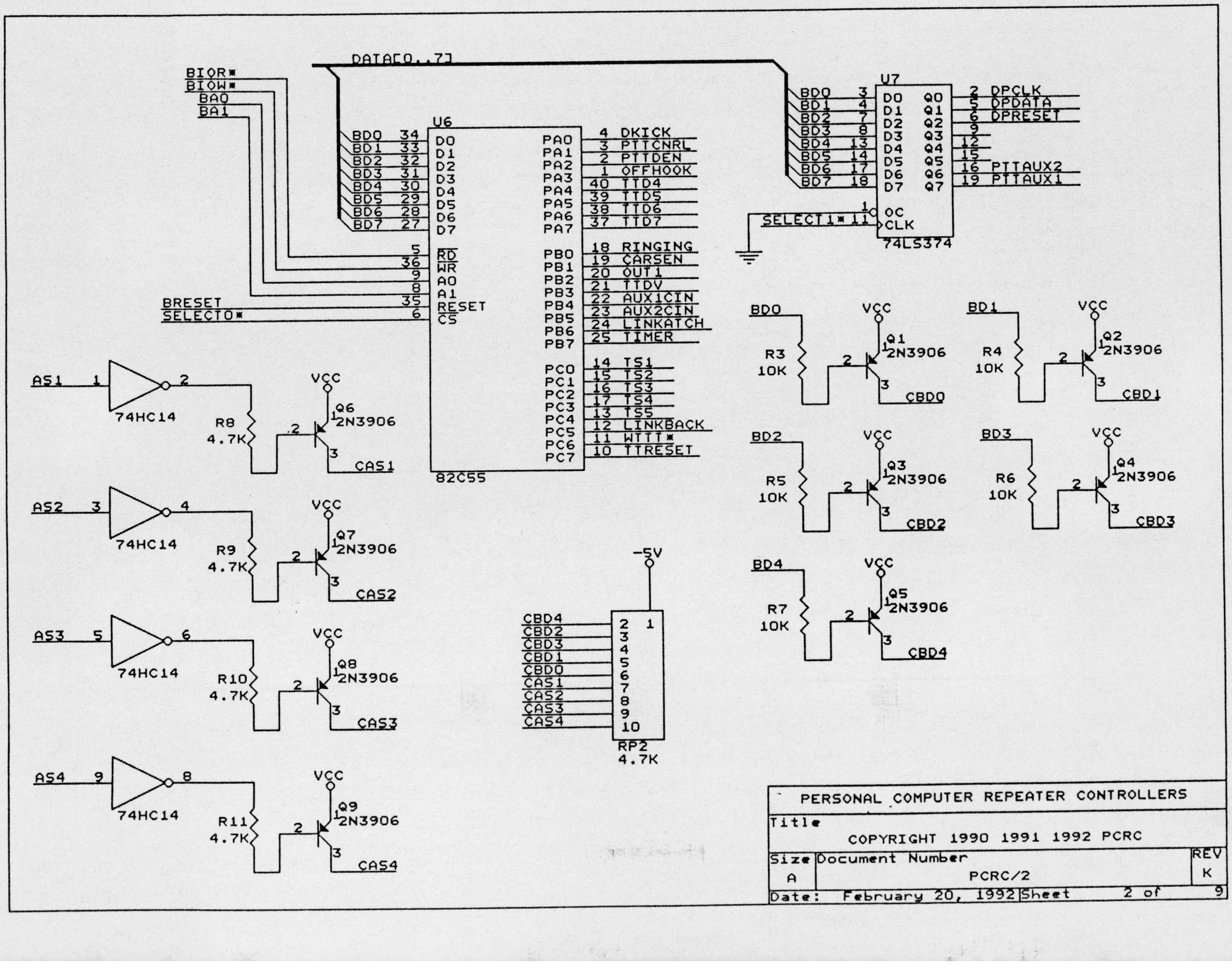
Date: April 21, 1992 Sheet 1 of 1


|8
7
6
3
1
5
4
|2
8 PIN DIN M
SOLDER SIDE VIEW
TO PCRC AUX1/2
8 PIN DIN M
DB9-M
1 AUXxAIN — TXAUDIO 6
3 AUXxAOUT — RXAUDIO 5
4 AUXxCIN — COS 7
5 AUXxCOUT — PTT 8
6 DC GND — COMGND\I 9
7 AUDIO GND — COMGND\I 9
TO RBI-1
DB25-M
TO PC LPT1:
8 RBI_RESET — RESET 1
7 RBI_DATA — DATA 3
6 RBI_CLOCK — CLOCK 4
18 DC GND — COMGND\I 9

PERSONAL COMPUTER REPEATER CONTROLLERS		
Title COPYRIGHT 1992 PCRC		
Size A	Document Number CABLE, RBI-1 TO PCRC/2 (tm)	REV
Date: April 21, 1992	Sheet 1 of 1	

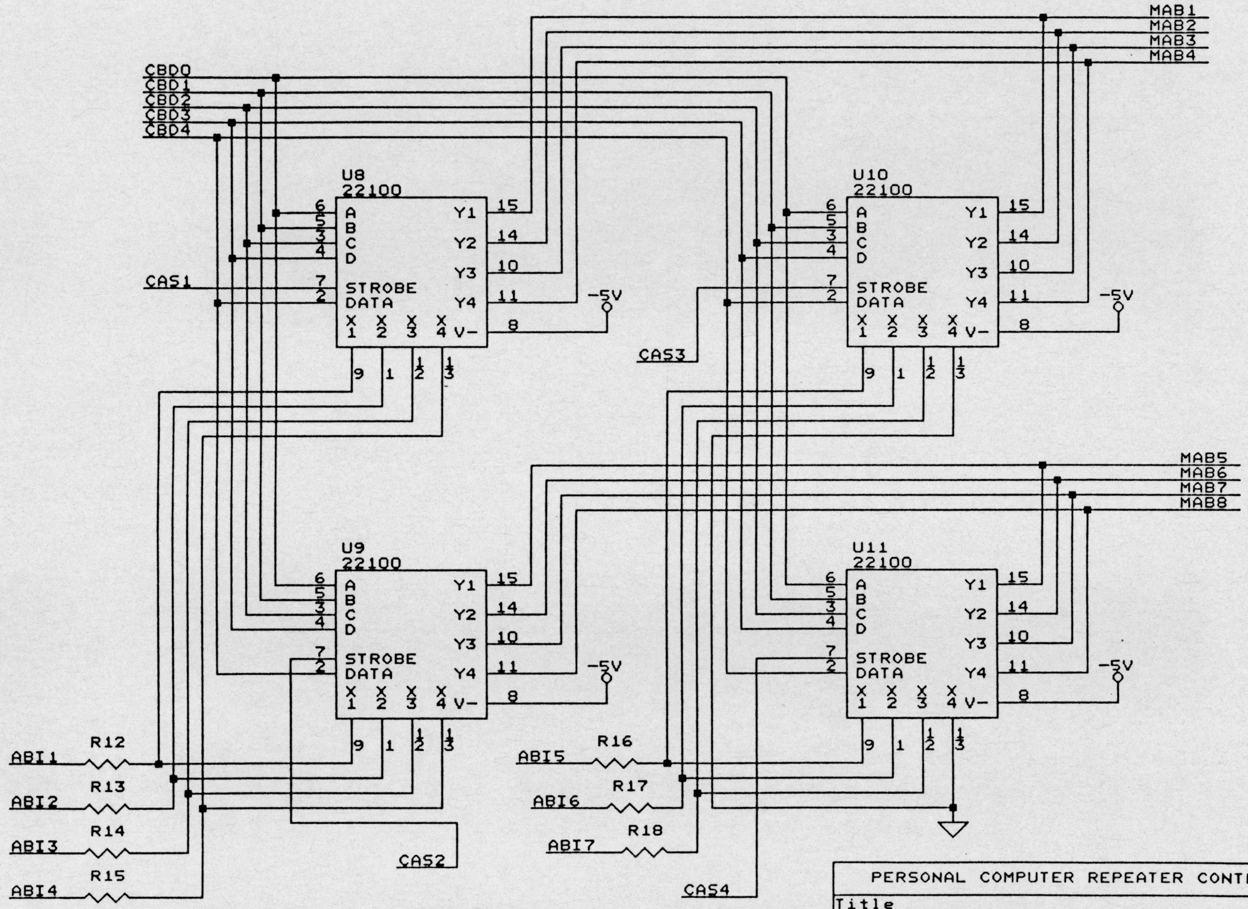

U1
74HC245
D0
D1
D2
D3
D4
D5
D6
D7
A1 A2 A3 A4 A5 A6 A7 A8
B1 B2 B3 B4 B5 B6 B7 B8
G
DIR
BD0
BD1
BD2
BD3
BD4
BD5
BD6
BD7
DATA[0..7]
BIOR*
BIOW*
U2
74LS245
A8
A9
IOR*
IOW*
AEN
RESET
BRESET
VCC
U3
74LS245
A0
A1
A2
A3
A4
A5
A6
A7
BA0
BA1
U4
PCRC2-1
A2
A3
A4
A5
A6
A7
IOR*
IOW*
AEN
A9
A8
BSEL1
BSEL2
SELECT3*
SELECT2*
SELECT1*
SELECT0*
DATA[0..7]
RP1
4.7K
OUT1
U5
PCRC2-2
SELECT0*
SELECT1*
SELECT2*
SELECT3*
A0
A1
IOR*
IOW*
DENAB*
S2R1*
S2R0*
S2W3
S2W2
S2W1
S2W0
TTREN*
DRESEN*
AS4
AS3
AS2
AS1
R2
4.7K
R1
4.7K
J5
4 HEADER
JUMP 1/2 3/4
0 0 2C0
0 1 280
1 0 240
1 1 200

PERSONAL COMPUTER REPEATER CONTROLLERS		
Title COPYRIGHT 1990 1991 1992 PCRC		
Size A	Document Number PCRC/2	REV K
Date: January 26, 1992	Sheet 1 of	9


DATA[0..7]
BIOR*
BIOW*
BA0
BA1
U6
82C55
BD0 34 D0
BD1 33 D1
BD2 32 D2
BD3 31 D3
BD4 30 D4
BD5 29 D5
BD6 28 D6
BD7 27 D7
5 RD
36 WR
9 A0
8 A1
BRESET 35 RESET
SELECT0* 6 CS
PA0 4 DKICK
PA1 3 PTTCNRL
PA2 2 PTTDEN
PA3 1 OFFHOOK
PA4 40 TTD4
PA5 39 TTD5
PA6 38 TTD6
PA7 37 TTD7
PB0 18 RINGING
PB1 19 CARSEN
PB2 20 OUT1
PB3 21 TTDV
PB4 22 AUX1CIN
PB5 23 AUX2CIN
PB6 24 LINKATCH
PB7 25 TIMER
PC0 14 TS1
PC1 15 TS2
PC2 16 TS3
PC3 17 TS4
PC4 13 TS5
PC5 12 LINKBACK
PC6 11 WTTT*
PC7 10 TTRESET
U7
74LS374
BD0 3 D0 Q0 2 DPCLK
BD1 4 D1 Q1 5 DPDATA
BD2 7 D2 Q2 6 DPRESET
BD3 8 D3 Q3 9
BD4 13 D4 Q4 12
BD5 14 D5 Q5 15
BD6 17 D6 Q6 16 PTTAUX2
BD7 18 D7 Q7 19 PTTAUX1
1 OC
SELECT1* 11 CLK
AS1 1 74HC14 2
R8 4.7K
VCC Q6 2N3906 1 2 3 CAS1
AS2 3 74HC14 4
R9 4.7K
VCC Q7 2N3906 1 2 3 CAS2
AS3 5 74HC14 6
R10 4.7K
VCC Q8 2N3906 1 2 3 CAS3
AS4 9 74HC14 8
R11 4.7K
VCC Q9 2N3906 1 2 3 CAS4
BD0 R3 10K VCC Q1 2N3906 1 2 3 CBD0
BD1 R4 10K VCC Q2 2N3906 1 2 3 CBD1
BD2 R5 10K VCC Q3 2N3906 1 2 3 CBD2
BD3 R6 10K VCC Q4 2N3906 1 2 3 CBD3
BD4 R7 10K VCC Q5 2N3906 1 2 3 CBD4
-5V
1
CBD4 2
CBD2 3
CBD3 4
CBD1 5
CBD0 6
CAS1 7
CAS2 8
CAS3 9
CAS4 10
RP2
4.7K

PERSONAL COMPUTER REPEATER CONTROLLERS

Title COPYRIGHT 1990 1991 1992 PCRC		
Size A	Document Number PCRC/2	REV K
Date: February 20, 1992	Sheet 2 of 9	


MAB1
MAB2
MAB3
MAB4
CBD0
CBD1
CBD2
CBD3
CBD4
U8
22100
U10
22100
6 A
5 B
3 C
4 D
7 STROBE
2 DATA
X1 X2 X3 X4
V-
Y1 15
Y2 14
Y3 10
Y4 11
8
-5V
CAS1
CAS3
9 1 1/2 1/3
MAB5
MAB6
MAB7
MAB8
U9
22100
U11
22100
CAS2
CAS4
ABI1
R12
ABI2
R13
ABI3
R14
ABI4
R15
ABI5
R16
ABI6
R17
ABI7
R18

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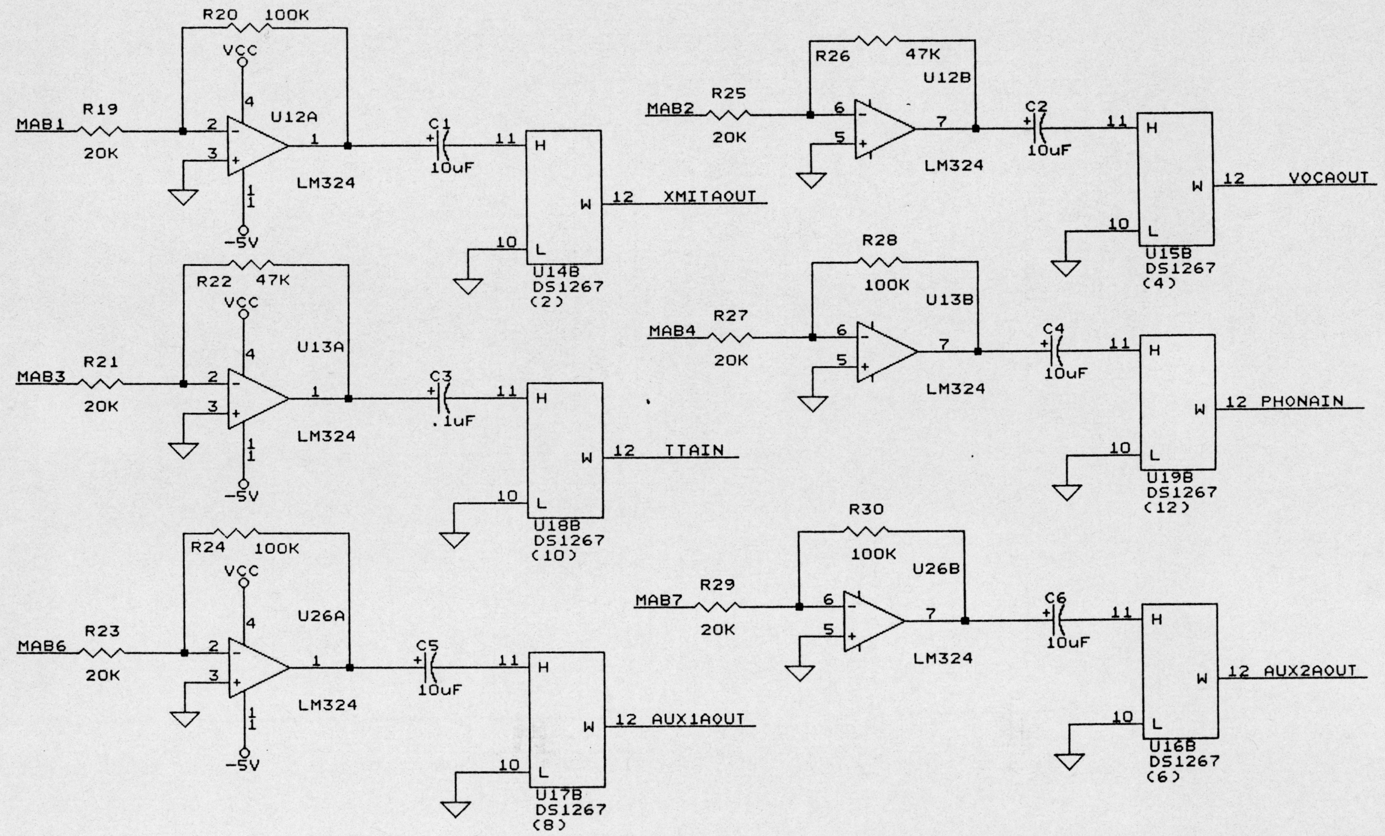
R20 100K
VCC
MAB1
R19
20K
U12A
LM324
-5V
C1
10uF
XMITAOUT
U14B
DS1267
(2)
R22 47K
MAB3
R21
20K
U13A
C3
.1uF
TTAIN
U18B
DS1267
(10)
R24 100K
MAB6
R23
20K
U26A
C5
10uF
AUX1AOUT
U17B
DS1267
(8)
R26 47K
U12B
MAB2
R25
20K
C2
10uF
VOCAOUT
U15B
DS1267
(4)
R28
100K
U13B
MAB4
R27
20K
C4
10uF
PHONAIN
U19B
DS1267
(12)
R30
100K
U26B
MAB7
R29
20K
C6
10uF
AUX2AOUT
U16B
DS1267
(6)
H
W
L

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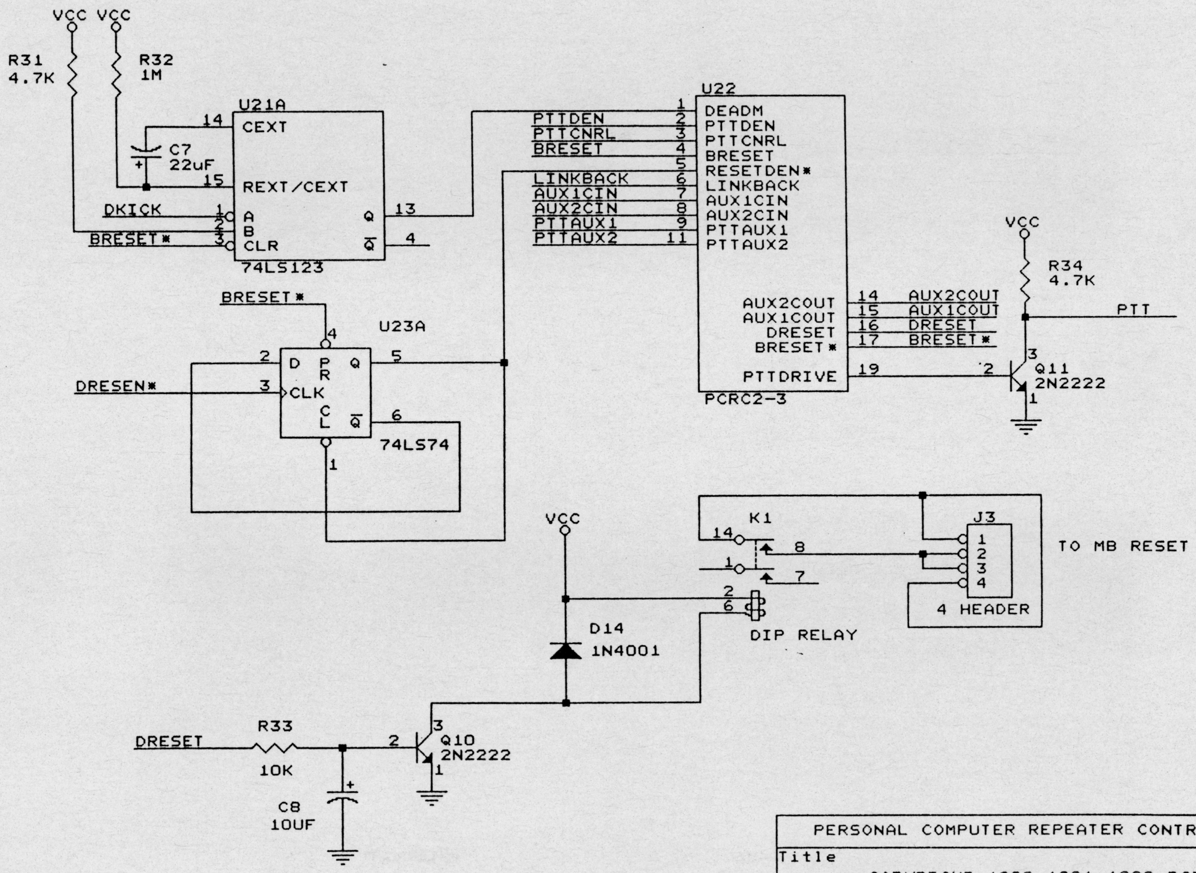
VCC
VCC
R31
4.7K
R32
1M
U21A
14
CEXT
C7
22uF
15
REXT/CEXT
DKICK
1
2
3
A
B
CLR
BRESET*
Q
13
Q̄
4
74LS123
BRESET*
4
U23A
2
D
P
R
Q
5
DRESEN*
3
CLK
C
L
Q̄
6
1
74LS74
U22
1 DEADM
2 PTTDEN
3 PTTCNRL
4 BRESET
5 RESETDEN*
6 LINKBACK
7 AUX1CIN
8 AUX2CIN
9 PTTAUX1
11 PTTAUX2
PTTDEN
PTTCNRL
BRESET
LINKBACK
AUX1CIN
AUX2CIN
PTTAUX1
PTTAUX2
AUX2COUT 14
AUX1COUT 15
DRESET 16
BRESET* 17
PTTDRIVE 19
PCRC2-3
AUX2COUT
AUX1COUT
DRESET
BRESET*
VCC
R34
4.7K
PTT
2
3
Q11
2N2222
1
K1
14
8
1
7
2
6
DIP RELAY
J3
1
2
3
4
4 HEADER
TO MB RESET
VCC
D14
1N4001
DRESET
R33
10K
C8
10UF
2
3
Q10
2N2222
1

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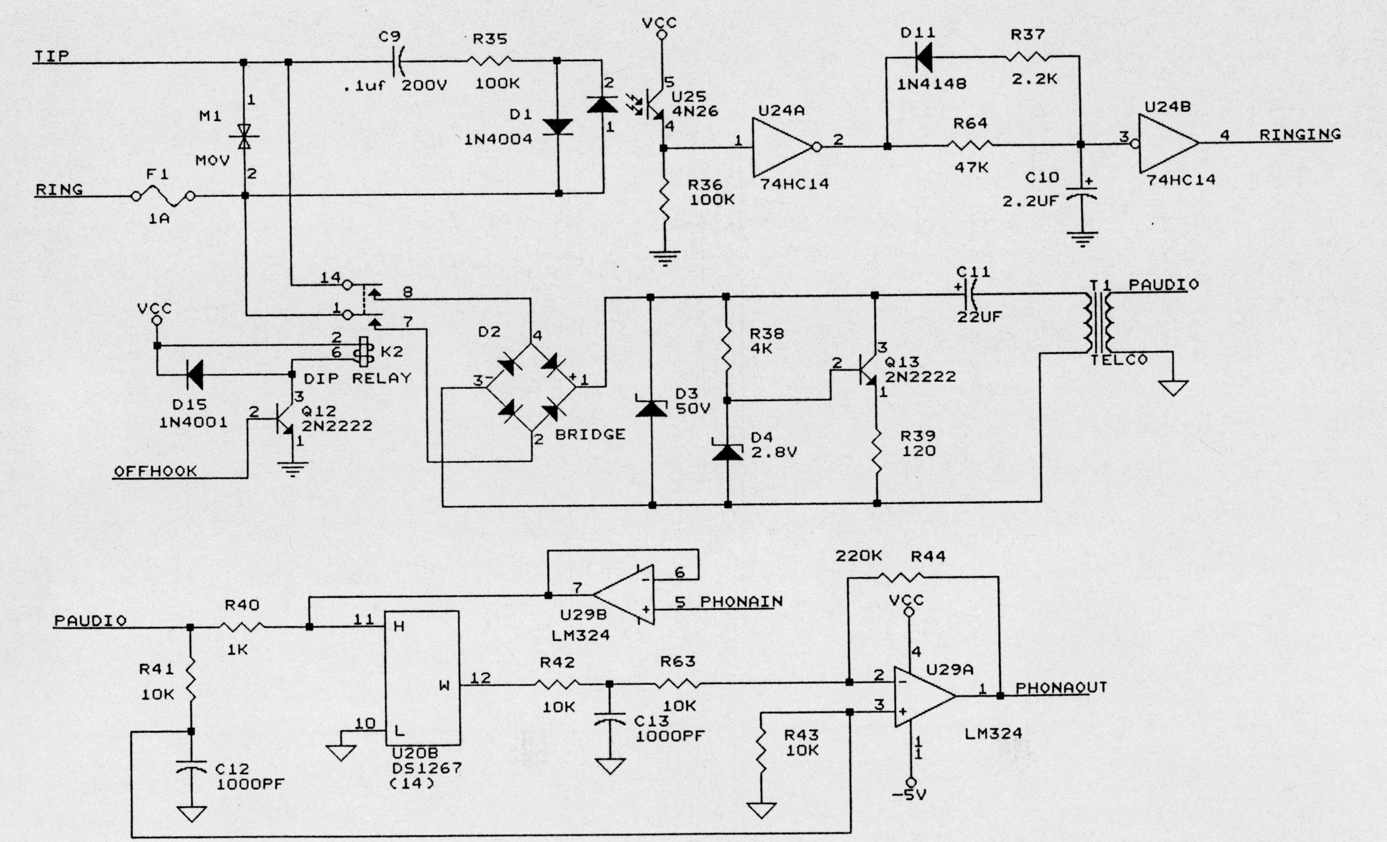
TIP
RING
F1
1A
M1
MOV
C9
.1uf 200V
R35
100K
D1
1N4004
VCC
U25
4N26
R36
100K
U24A
74HC14
D11
1N4148
R37
2.2K
R64
47K
C10
2.2UF
U24B
74HC14
RINGING
C11
22UF
T1
PAUDIO
TELCO
K2
DIP RELAY
D15
1N4001
Q12
2N2222
OFFHOOK
D2
BRIDGE
D3
50V
R38
4K
D4
2.8V
Q13
2N2222
R39
120
PAUDIO
R40
1K
R41
10K
C12
1000PF
U20B
DS1267
(14)
U29B
LM324
PHONAIN
R42
10K
C13
1000PF
R63
10K
R43
10K
220K
R44
U29A
LM324
-5V
PHONAOUT

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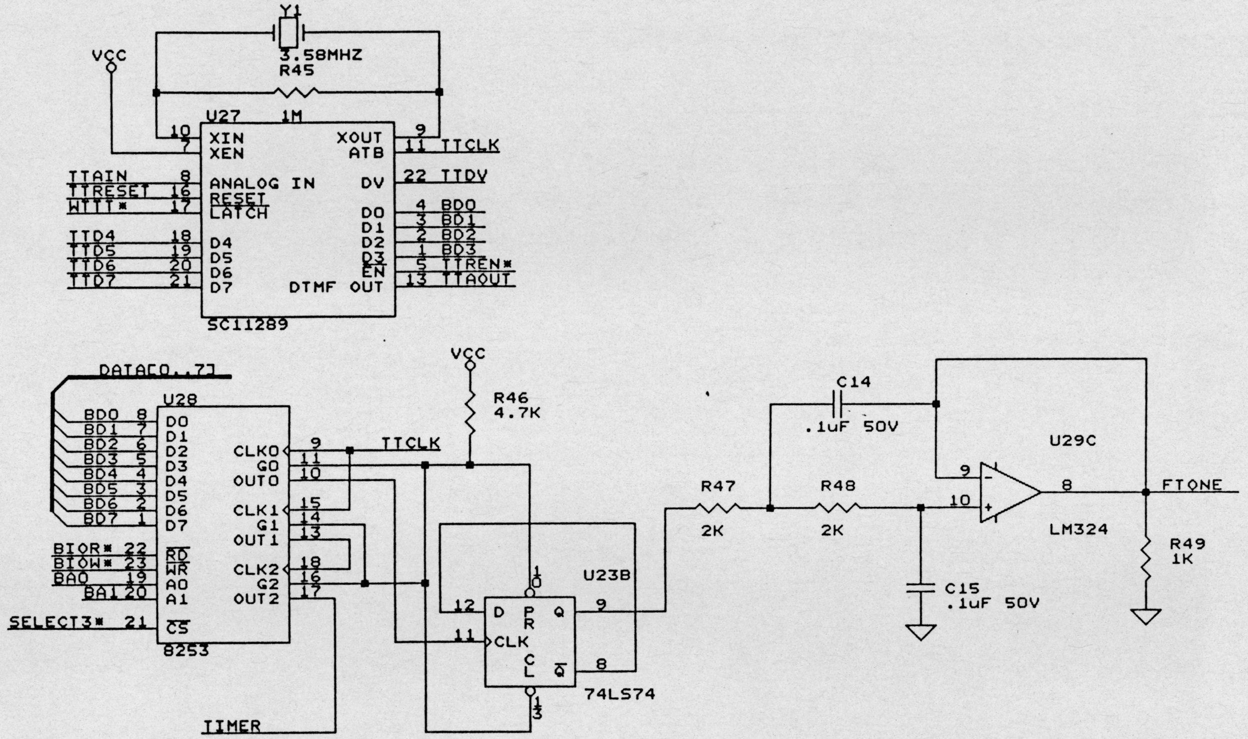
Y1
3.58MHZ
R45
1M
VCC
U27
10
7
XIN
XEN
XOUT
ATB
9
11 TTCLK
TTAIN 8
TTRESET 16
WTTT* 17
ANALOG IN
RESET
LATCH
DV
22 TTDV
D0
D1
D2
D3
EN
4 BD0
3 BD1
2 BD2
1 BD3
5 TTREN*
13 TTAOUT
TTD4 18
TTD5 19
TTD6 20
TTD7 21
D4
D5
D6
D7
DTMF OUT
SC11289
DATA[0..7]
U28
BD0 8
BD1 7
BD2 6
BD3 5
BD4 4
BD5 3
BD6 2
BD7 1
D0
D1
D2
D3
D4
D5
D6
D7
BIOR* 22
BIOW* 23
BA0 19
BA1 20
SELECT3* 21
RD
WR
A0
A1
CS
8253
CLK0
G0
OUT0
CLK1
G1
OUT1
CLK2
G2
OUT2
9
11
10
15
14
13
18
16
17
TTCLK
VCC
R46
4.7K
TIMER
U23B
1
0
12
D
PR
Q
9
11
CLK
CL
Q̄
8
1
3
74LS74
C14
.1uF 50V
R47
2K
R48
2K
C15
.1uF 50V
U29C
9
10
8
LM324
FTONE
R49
1K

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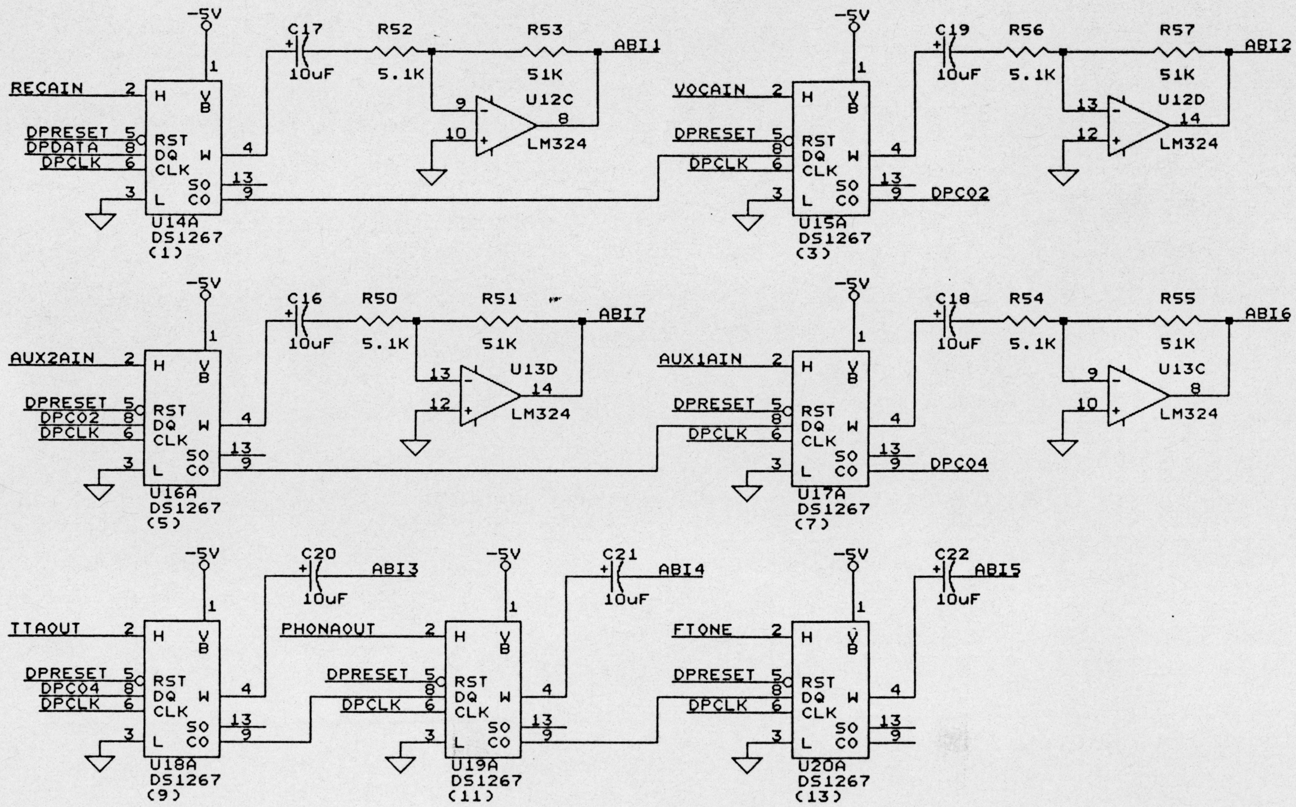
-5V
C17
10uF
R52
5.1K
R53
51K
ABI1
RECAIN
DPRESET
DPDATA
DPCLK
H
VB
RST
DQ
CLK
W
SO
CO
L
U14A
DS1267
(1)
U12C
LM324
-5V
C19
10uF
R56
5.1K
R57
51K
ABI2
VOCAIN
DPRESET
DPCLK
U15A
DS1267
(3)
DPC02
U12D
LM324
-5V
C16
10uF
R50
5.1K
R51
51K
ABI7
AUX2AIN
DPRESET
DPC02
DPCLK
U16A
DS1267
(5)
U13D
LM324
-5V
C18
10uF
R54
5.1K
R55
51K
ABI6
AUX1AIN
DPRESET
DPCLK
U17A
DS1267
(7)
DPC04
U13C
LM324
-5V
C20
10uF
ABI3
TTAOUT
DPRESET
DPC04
DPCLK
U18A
DS1267
(9)
-5V
C21
10uF
ABI4
PHONAOUT
DPRESET
DPCLK
U19A
DS1267
(11)
-5V
C22
10uF
ABI5
FTONE
DPRESET
DPCLK
U20A
DS1267
(13)

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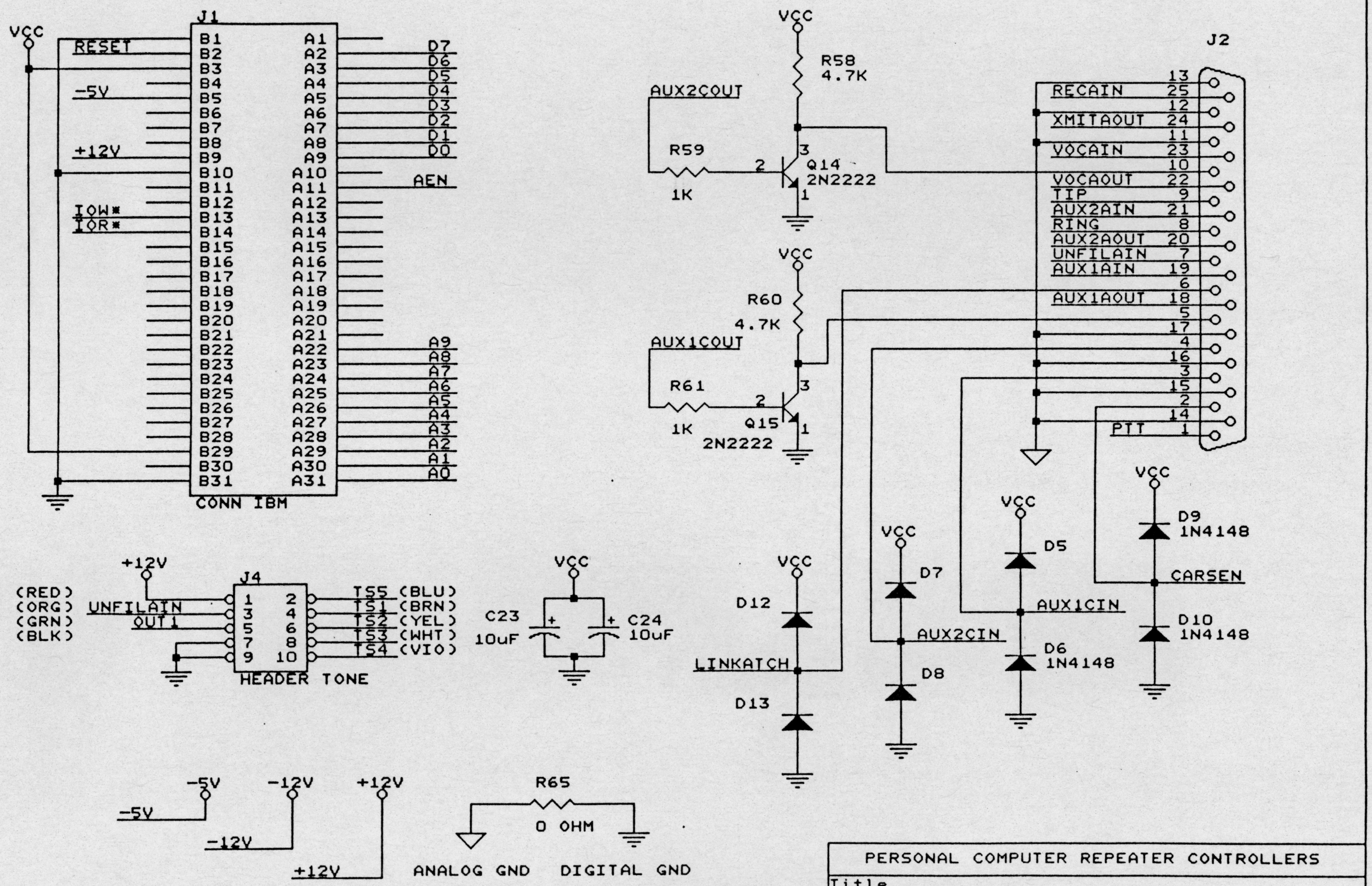
J1
CONN IBM
VCC
RESET
-5V
+12V
IOW*
IOR*
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
B13
B14
B15
B16
B17
B18
B19
B20
B21
B22
B23
B24
B25
B26
B27
B28
B29
B30
B31
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
A15
A16
A17
A18
A19
A20
A21
A22
A23
A24
A25
A26
A27
A28
A29
A30
A31
D7
D6
D5
D4
D3
D2
D1
D0
AEN
A9
A8
A7
A6
A5
A4
A3
A2
A1
A0
AUX2COUT
R59
1K
R58
4.7K
Q14
2N2222
AUX1COUT
R61
1K
R60
4.7K
Q15
2N2222
J2
RECAIN
XMITAOUT
VOCAIN
VOCAOUT
TIP
AUX2AIN
RING
AUX2AOUT
UNFILAIN
AUX1AIN
AUX1AOUT
PTT
13
25
12
24
11
23
10
22
9
21
8
20
7
19
6
18
5
17
4
16
3
15
2
14
1
D12
LINKATCH
D13
D7
AUX2CIN
D8
D5
AUX1CIN
D6
1N4148
D9
1N4148
CARSEN
D10
1N4148
J4
HEADER TONE
+12V
(RED)
(ORG)
(GRN)
(BLK)
UNFILAIN
OUT1
TS5 (BLU)
TS1 (BRN)
TS2 (YEL)
TS3 (WHT)
TS4 (VIO)
C23
10uF
C24
10uF
-5V
-12V
+12V
R65
0 OHM
ANALOG GND
DIGITAL GND

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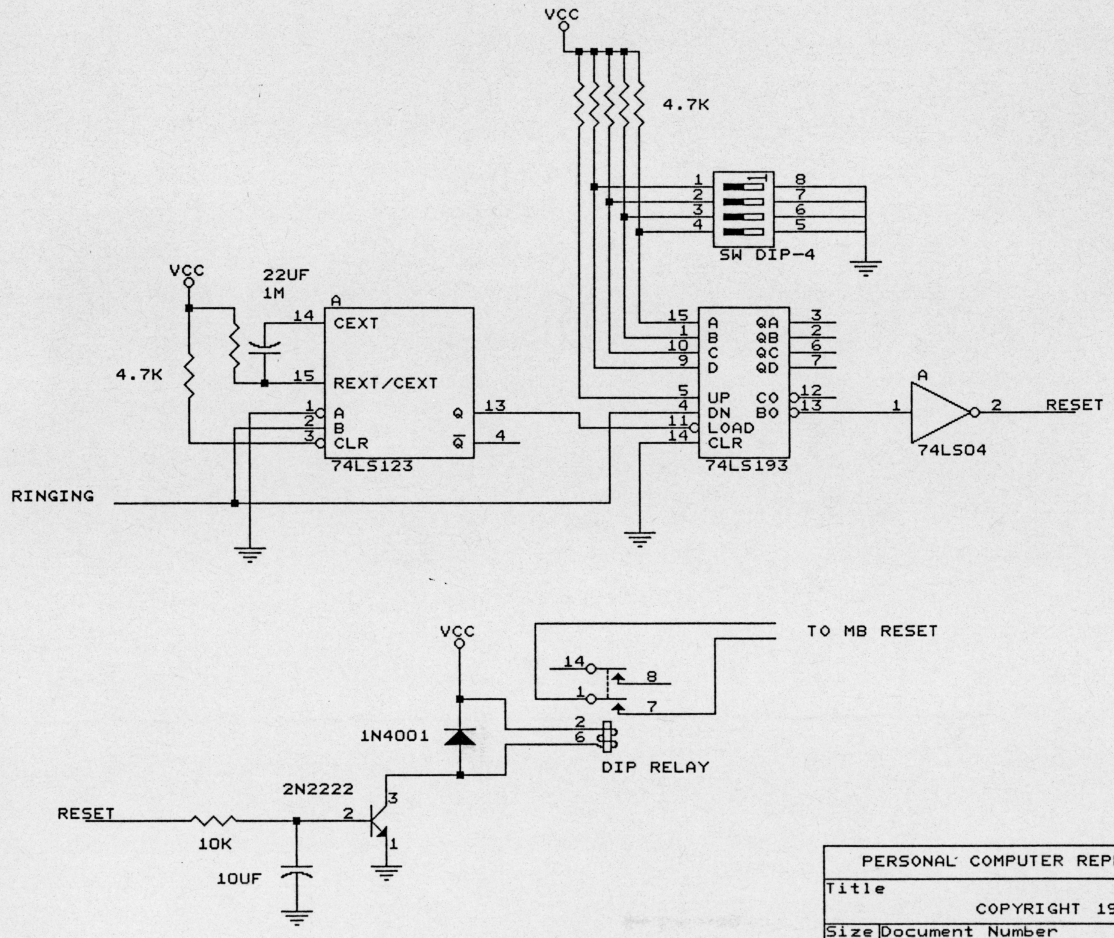
APPENDIX G

The following circuit can be used to remotely reset the repeater system based upon a pre-determined number of 'rings' on an incoming telephone line. The number of rings are determined by the binary pattern selected by the dip switch settings.

Pin 15 of the 74LS193 is the LSB, and pin 9 is the MSB. To select 10 rings, a pattern of '1010' is entered.


VCC
4.7K
1
2
3
4
8
7
6
5
SW DIP-4
VCC
22UF
1M
A
14
CEXT
4.7K
15
REXT/CEXT
1
A
2
B
3
CLR
Q
13
Q̄
4
74LS123
RINGING
15
A
1
B
10
C
9
D
QA
3
QB
2
QC
6
QD
7
5
UP
4
DN
11
LOAD
14
CLR
CO
12
BO
13
74LS193
A
1
2
RESET
74LS04
VCC
TO MB RESET
14
8
1
7
2
6
DIP RELAY
1N4001
2N2222
3
2
1
RESET
10K
10UF

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